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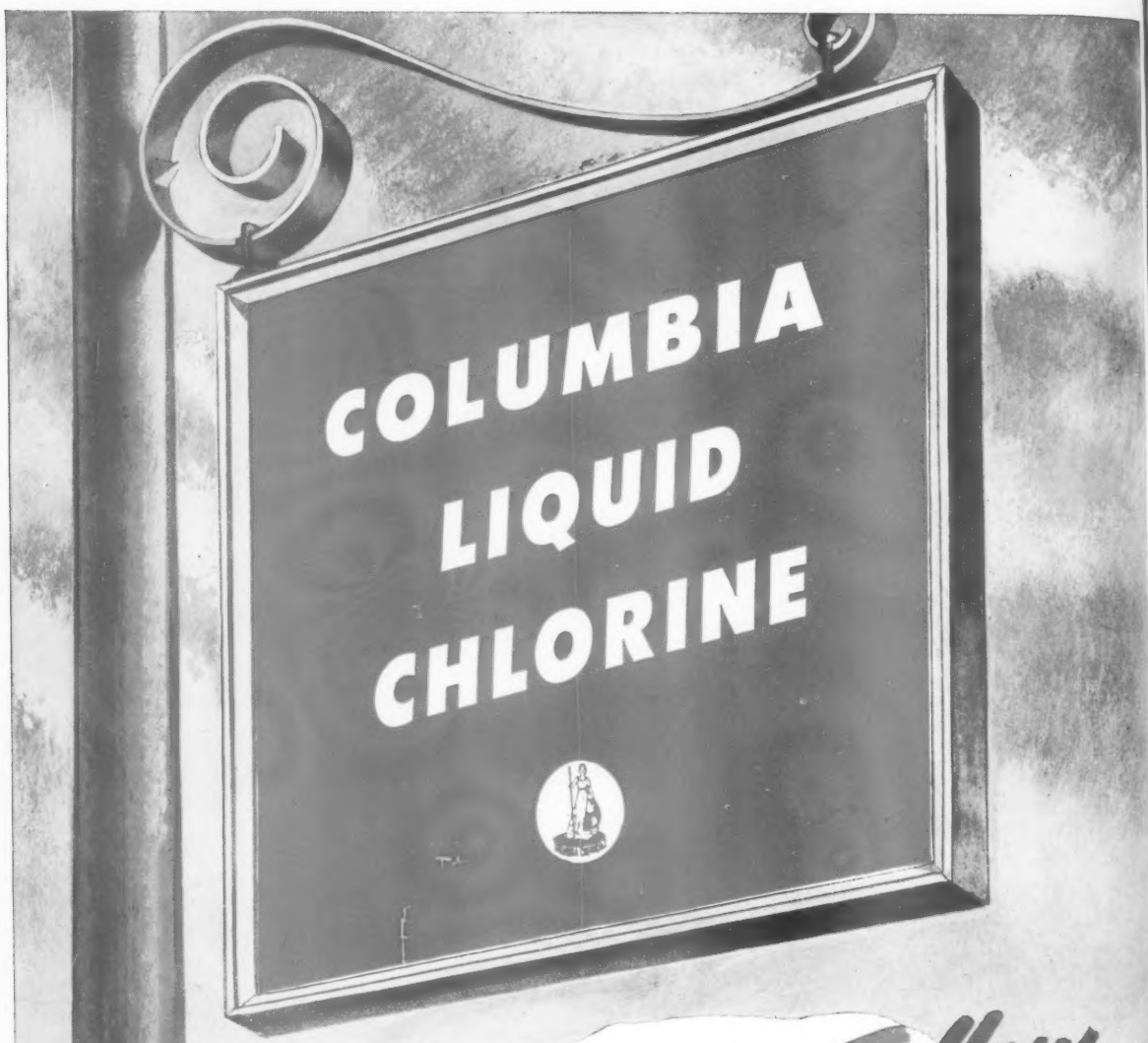

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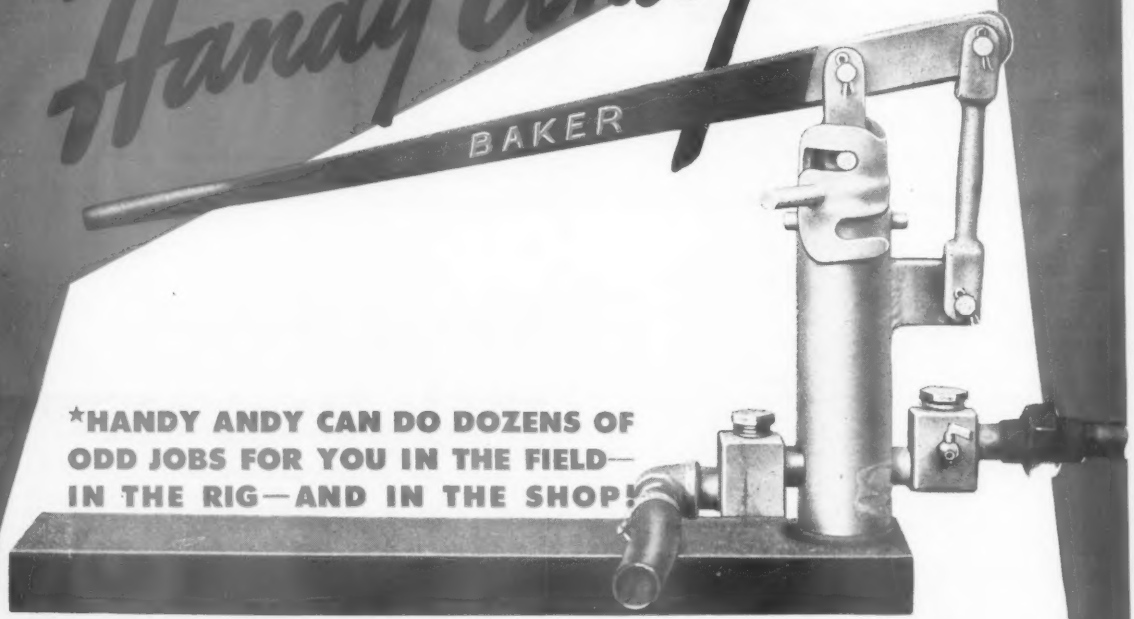
MEET
"Handy Andy"★



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the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 158

CRUDE-OIL STOCKS 214,098,000 bbl. as of August 11—down 1,284,000 bbl. One year ago 223,597,000 bbl.

GASOLINE STOCKS 86,307,000 bbl. as of August 11—up 1,495,000 bbl. One year ago 79,715,000 bbl.

RESIDUAL FUEL-OIL STOCKS 42,927,000 bbl. as of August 11—up 85,000 bbl. One year ago 57,222,000 bbl.

GAS OIL AND DISTILLATE STOCKS 36,977,000 bbl. as of August 11—up 256,000 bbl. One year ago 39,414,000 bbl.

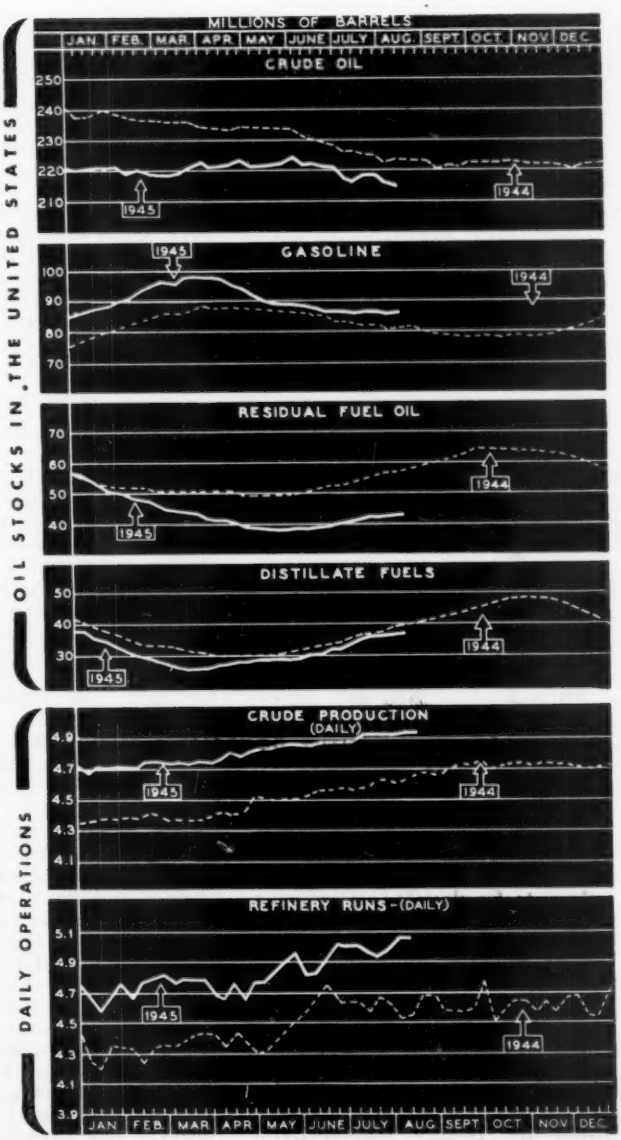
CRUDE-OIL PRODUCTION 4,932,650 bbl. as of August 18—down 950 bbl. One year ago 4,678,450 bbl.

REFINERY RUNS 5,072,000 bbl. daily week ended August 11—down 5,000 bbl. One year ago 4,546,000 bbl.

THE stripper-well subsidy plan appears temporarily safe from the wholesale cancellation of wartime measures which were issued this week from Washington with staccato rapidity. Practically every producer in the country this week became concerned with the future of the subsidy plan which has been in operation more than a year. No formal announcement has been issued by the Office of Economic Stabilization or the Office of Price Administration concerning the subsidy plan which would limit its application short of June 30, 1946. Uncertainty, however, has caused a renewal of interest in crude prices and many producers are urging renewed effort by the industry to obtain higher postings.

IN a weekly report by Russell B. Brown, general counsel, to Ralph T. Zook, president, Independent Petroleum Association of America, it was said that "no changes are planned at this time." Termination, Brown said he was informed, would be determined by agencies directing the plan, chiefly the OES and OPA. Subsidies to stripper producers have been tied to crude-oil price ceilings and designated as revisions to such regulations. Congress authorized payment of $290,000,000 during the fiscal year ending June 30, 1946, in producer and transportation subsidies. It was estimated that only $75,000,000 of the total appropriation would be required for the crude subsidy with remainder of $215,000,000 applicable to defrayment of extra petroleum transportation costs.

OPA this week gave evidence of removing support for extra transportation costs by announcing that product-price ceilings on the East Coast will be rolled back to remove this compensation. This may be significant in OPA thinking on the whole question of petroleum subsidy. If the price agency rolls back crude ceilings accordingly the industry has cause for deep concern. There can be little doubt that the subsidy prolonged producing life of numerous stripper properties and permitted operators in this classification to continue development and exploration. If their income is reduced to a profitless level, an important segment of production and vigorous operators may be eliminated from the industry before a free market could save them.



Wartime Controls Are Being Abolished on Wholesale Basis

by Henry D. Ralph

WASHINGTON.—Government wartime controls over industry were dropped by the score during the first week after capitulation of Japan and many emergency agencies began to liquidate, though some controls are slated to remain in effect for many months.

First to be dropped, within a few hours after surrender was announced, was rationing of gasoline and fuel oil, and motorists all over the country rushed to "fill 'er up." Although the oil industry had rather expected rationing to continue for a week or two to permit working stocks to be built up, very few local shortages were reported and these were quickly corrected.

The Petroleum Administration for War announced that there are ample supplies of gasoline and fuel oil as the Army and Navy cutback their requirements and released stocks. The prospects are for ample supplies of fuel oil in all parts of the country this winter, and all restrictions on converting from coal to oil fuel have been removed.

Quality restrictions on gasoline, except for minimum specifications, were also removed, and the octane rating of civilian motor fuel is now unlimited.

Tire Situation

All other restrictions on the use of gasoline-powered vehicles also were removed by the Office of Defense Transportation. These included the 35-mile wartime speed limit, restrictions on taxicab operation, substitution of buses for street cars, and use of sightseeing buses.

All authorities, however, warned that the tire situation will not permit unlimited motoring. Military tire procurement has been cutback virtually to zero for the present, but it will take months to fill the civilian-tire demand. War Production Board officials estimated that during the fourth quarter of this year between 8,000,000 and 10,000,000 passenger car tires and 5,000,000 truck tires will be produced. Tire rationing will continue until supplies are adequate for all demands, and local boards will issue certificates for new tires on the basis of occupational needs.

The Petroleum Administration for War probably will cease to exist before the end of the year, it was estimated by Deputy Administrator Ralph K. Davies, but actual liquidation has not yet started. PAW announced the end of its long series of refinery controls and directives; most of them immediately, others within 30 days. Most controls over production, transportation and marketing were expected to be dropped within a very short time, as PAW officials were working hard on cancellation of them early this week.

The Petroleum Industry War Council probably will remain in existence as long as PAW does, and there was some unofficial talk of continuing PIWC on a reduced basis as a peacetime federation of oil industry trade associations. The council's next meeting was scheduled for September 26, but the date probably will be advanced in view of recent developments.

Many other war agencies moved even faster to get rid of controls. The Office of Censorship went completely out of business less than 24 hours after the Japanese surrender was announced. The Office of War Utilities dropped all its controls over the use of natural gas and installation of gas-burning equipment, and announced that it would cease to exist on September 30.

Tank Cars and Tank Trucks

All restrictions on the use of tank cars and tank trucks were dropped by the ODT with the revocation of its General Orders 7 and 37.

PAW recommended the discontinuance of rail shipments of West Texas crude oil to California and the subsidy payments made to California refineries to cover this transportation cost. Subsidies on rail shipments of Texas crude to Mid-Continent refineries, and of products to the East Coast were expected to be dropped very shortly as no longer necessary.

Future plans of the Office of Price Administration have not been announced beyond statements that price control must be continued for many months to prevent postwar inflation. However, OPA stands ready to remove or suspend ceilings on any commodity which is in ample supply to meet demands.

PAW officials were not yet ready to estimate the demands for petroleum products during the next few months nor the rate of crude production which will be necessary. However, they expected to cut crude production certifications to maximum efficient rate of production. The certification system probably will be dropped and production control returned to the states, with PAW making recommendations as to required production.

The War Production Board dropped all but about 40 of its more than 400 outstanding orders, completely removing limitations and priority control from most commodities. Restrictions on the use of such scarce materials as crude rubber, tin, Manila fiber, newsprint, and a few others will be continued in modified form for some time. Most materials for industry will be available in ample quantities for all needs either at once or as soon as manpower can be shifted from war contracts to normal activities, WPB officials estimated, and this likewise applies to industrial components such as motors, pumps, and bearings.

WPB will retain its priority control powers for the time being to stimulate production of scarce articles, to break bottlenecks in reconversion, to channel certain materials to the remaining military needs and essential civilian uses, to assist small manufacturers to reconvert, and to prevent manufacturers from cornering the market and building up huge inventories of materials still in short supply. Most items of equipment and supply for the oil industry are expected to be in adequate supply within a period of weeks as producers clear their plants of war work and turn their labor forces to their backlogs of industry orders.

OPA, PAW, and Reconstruction Finance Corp. officials have decided that RFC will continue to make compensatory adjustment payments for a limited period for excess transportation costs on certain shipments made with approval of PAW.

OPA announced that it will shortly reduce ceiling prices on gasoline and fuel oils in District 1 by the amounts increased to help defray the extra cost of rail transportation, and range from 0.6 to 1.2 cents per gallon for gasoline, from 1 to 1.5 cents per gallon for kerosene, distillate fuel oil, and diesel fuel, and from 15 to 30 cents per barrel for residual. OPA expects to make the cuts effective at the refinery and wholesale level September 1 and at the retail level later in September. RFC will continue to pay the balance of the rail costs for the present.

Summary of Canceled Regulations

Petroleum supplies.—Petroleum Administrator for War Harold L. Ickes announced August 15 that ample quantities of civilian gasoline will be available effective immediately. Likewise, there will be sup-

plies of heating oil and fuel oil adequate to meet normal peacetime requirements, he added.

Quality restrictions on gasoline will also be lifted immediately, according to Deputy Administrator Ralph K. Davies.

California shipments.—The Petroleum Administration for War has recommended discontinuance of shipments of crude oil from West Texas to California refineries, Deputy Petroleum Administrator Ralph K. Davies announced August 17. For the last several months, between 30,000 and 40,000 bbl. a day of West Texas crude oil has been moved by rail to California in order to make use of refining capacity in the war program that was idle owing to lack of sufficient crude oil from normal local sources.

PAW liquidation.—The Petroleum Administration for War will commence immediately the liquidation of its affairs with a view to closing the agency at the earliest possible date.

Existing wartime controls would be withdrawn as rapidly as possible in the production, refining, transportation and marketing branches and the oil industry freed to operate upon a normal peacetime basis.

New tires. — New passenger car tires will continue to be rationed largely on the basis of occupational driving needs, the Office of Price Administration announced August 16. A very limited number of tires will be available for non-occupational driving under the new eligibility rules.

War utilities.—Office of War Utilities will wind up its operations and be dissolved by September 30.

Speed laws.—The nation-wide 35-mile-an-hour speed limit was lifted August 18 by the Office of Defense Transportation.

Traveling.—Revocation or relaxation of some of the wartime controls of passenger transportation and the retention of others as long as military travel remains heavy were announced August 17 by the Office of Defense Transportation.

Sightseeing.—The wartime ban on sightseeing and charter bus service will be revoked by the Office of Defense Transportation, effective August 31, 1945.

Bus service.—The Office of Defense Transportation order that prohibited substitution of bus service for street car or railroad service will be revoked, effective August 31.

Transport offices. — Forty-eight district and field offices of the highway transport department of the Office of Defense Transportation will be closed within 30 days, the ODT announced August 18. The staffs of three other district offices will be reduced to one representative each.

Tank-cars freed. — Revocation of orders and regulations of the Office of Defense Transportation which made possible the largest movement of petroleum by rail in the history of transportation became effective August 19.

Tire rationing.—OPA discontinued rationing of all farm-implement and industrial-type tires August 20 Truck and passenger car tires will continue rationed.

Waterway movement.—ODT lifted all restrictions on movement of petroleum on inland waterways and the Great Lakes by revoking its Order 19.

Natural gas.—Office of War Utilities revoked Order U-7 which prohibited new uses for natural gas and additional space heating, and provided for integrating natural-gas operations. OWU also withdrew its request to gas companies not to promote increased sales of gas.

California Operators Face Problems In Postwar Conversion Programs

by L. P. Stockman

LOS ANGELES.—The immediate effect of reconversion in California is somewhat clouded but it has become obvious that crude-oil production will be reduced at an early date even though there is sufficient empty storage to take care of any overproduction for several months. It is not likely, however, that marketers will be willing to accumulate excessive stocks again although another 10,000,000 bbl. would permit greater flexibility.

The first effect of the war's end will undoubtedly be the elimination of all production in excess of the maximum efficient rate and reduction in some other fields where operators are desirous of reducing production to lower levels. California refineries have curtailed operations of high-octane plants. Upgrading of civilian gasoline has started.

Butadiene production will continue for an indefinite period. Important technical advances in the application of synthetic rubber will permit operation of present plants on the Pacific Coast at present levels until early in 1946 at which time operating status may be reduced to meet changing conditions. Movement of West Texas crude will end when present stocks and oil in transit have been liquidated.

Operators wish to restore depreciated properties quickly but at low prices for crude oil and higher cost of needed equipment and wages in proportion the outlook is not bright.

Most companies have formulated postwar plans but the sudden end to the Jap war left a number of problems unsolved. There is some question whether the federal Government will permit operators to get together under supervision to determine the best method of operation and for this reason there are no general meetings scheduled. It is thought the best policy would be to permit PAW and PIWC to make definite recommendations as this would not conflict with the consent decree entered in the federal court at San Francisco several years ago.

Four Texas Gas-Conservation Projects Follow Freeing of Materials

HOUSTON.—Authorization of four gas conservation projects costing $3,500,000 and designed to conserve for productive use 56,000,000 cu. ft. of natural gas daily was announced by Humble Oil & Refining Co. this week. The projects involve five fields in the Gulf Coast. They are West Clear Lake, Friendswood, Anahuac, and Lovell Lake fields in Texas, and the North Crowley field in Louisiana. Humble will construct two natural gasoline plants, one at West Clear Lake and the other at Anahuac, and install compressors at Lovell Lake and North Crowley.

The plant at West Clear Lake will process daily 5,000,000 cu. ft. from Clear Lake, 20,000,000 cu. ft. from Friendswood, and 6,000,000 cu. ft. from the Dickinson-Gillock field. This plant is expected to recover from the gas 25,000 gal. of liquid products daily.

The plant to be built at Anahuac will have a capacity to process 12,000,000 cu. ft. of gas daily and recover 5,400 gal. a day of liquid products.

The Lovell Lake project involves

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the installation of additional compressors in order to gather 4,500,000 cu. ft. of gas daily and to boost the pressure so that the gas may be delivered to a transmission line which is already connected with the field. Additional equipment will also be installed at the North Crowley field in the Louisiana Gulf Coast which will deliver approximately 8,000,000 cu. ft. of gas daily into transmission lines.

These projects represent an expansion of the Humble company's gas conservation program which has been carried on for a number of years. The most important project by Humble last year was the installation of equipment at the Tomball field to conserve 8,000,000 cu. ft. of gas daily by compressing it for gas lift and delivery to gas lines. The shortage of critical materials during the war has prevented the development of other projects previously. The gas which the West Clear Lake and Anahuac plants will process is that which is being currently produced with the oil from the fields the plants will serve. Completion of these projects will make possible full utilization of all the gas that is produced with oil in these fields.

Wiess Predicts 12-Month Lull In Crude-Oil Demand

IMPORTANCE of prompt adjustments of production to declining demand is emphasized in an informative discussion by H. C. Wiess, president of Humble Oil & Refining Co., in the current issue of the company's publication "Humble Way." Taking as his subject, "After V-J Day," Wiess points out that crude-oil producers will face troublesome times during the coming year. Abnormal war demands will disappear, and market outlets will shrink rapidly. As production recedes the cost per barrel will rise, particularly in Texas and California, because of the lower output per well. Failure to meet the new conditions wisely will result in oversupply and waste, he says.

"The relative magnitude of the adjustment that will be required in crude-oil output is rather clearly indicated," says Wiess, "although the exact level of demand will depend in part upon the speed with which reconversion to peacetime production is carried forward, the policy that may be pursued with regard to meeting military demands for oil out of accumulated stocks, and similar factors. At best, the conclusion is inescapable that the petroleum industry will experience a sharp decline in demand. This is readily apparent from a brief consideration of the probable changes in military and civilian demands.

"The reported military requirements of 1,600,000 bbl. daily of petroleum represent an expansion of several times the amounts consumed by the armed forces of the United States in 1939. It would be extremely difficult for anyone to estimate the actual military consumption of refined products in the first year after the defeat of Japan. That will depend on the military forces that may be maintained abroad, the rate of demobilization, and other factors undetermined at this time. The armed forces will not need to purchase as much oil as they consume for a period following V-J Day. Within the year purchases for actual military use may well decline by 60 per cent or more.

Civilian Demand Will Increase

"Civilian demands will increase whenever it is possible to remove the remaining restrictions on consumption. Such demands probably will not return immediately to the level of 1941. Industrial consumption of fuel oil and other products will decline as production does, and during the 12-month period it may be less than the demand in 1941, depending upon the extent of reconversion from coal back to fuel oil. The demand for heating oil for homes will increase, but not in large amount. The principal handicap to other civilian consumption will be the smaller number of passenger cars and the higher average age of these vehicles. Passenger-car registrations in the United States in 1944 were about 25,000,000, or nearly 4,000,000 less than in 1941. The average car in 1941 consumed more than 16 bbl. of gasoline. The decline in registrations represents the loss of a market that might amount to 175,000 bbl. daily. Furthermore, the cars in use now are much older and not driven so much because of their less satisfactory mechanical condition, so that their annual consumption will be lower than in 1941. In view of all these circumstances, nonmilitary demands for petroleum products cannot be expected to increase by more than a few hundred thousand barrels daily in the first 12 months. This may well fall short nearly 1,000,000 bbl. daily of balancing the maximum decline in military demand.

"Domestic demand will be the primary determinant of crude-oil production, but the relation of exports and imports will also have some influence. In 1941, exports of petroleum from the United States exceeded imports by only 35,000 bbl. daily. Since 1941, there has been an expansion in foreign crude-oil production in the order of magnitude of 500,000 bbl. daily, or more. The existence of this additional capacity and the pressure of great foreign reserves on the market will make it difficult for this country to maintain any sizable export balance of petroleum. Exports should not be counted upon to cushion the shock of the postwar drop in domestic and military demands, since they will decline as soon as the regular flow of oil in world trade can be resumed.

"Another factor that may influence crude-oil production is the accumulation of crude-oil stocks. Some additions to stocks may be justified or required because of withdrawals that have occurred during the war. In the past 4 years, withdrawals of crude oil and refined products have amounted to about 66,000,000 bbl. in California and 34,000,000 bbl. in the rest of the United States. These areas are relatively self-contained in normal times with regard to petroleum, because of the high cost of transportation between them, so that stocks must be considered separately for the two areas. The additions required to replace half of the withdrawals since 1941 outside of California would average 50,000 bbl. daily for a year, or only about 1.5 per cent of the estimated production for the area. As demand decreases and refinery runs of crude decline correspondingly, there will be less need to rebuild stocks. Postwar production, therefore, must be closely related to demand.

Superior Sells Its Holdings In Kettleman Hills Field

LOS ANGELES. — Superior Oil Co. has disposed of its holdings in the Kettleman Hills field to a group of operators including General Petroleum Corp. of California, Seaboard Oil Co. of Delaware, Continental Oil Co., Shell Oil Co., Inc., Honolulu Oil Corp., and Standard Oil Co. of California.

C. P. Watson, vice president of Seaboard, said, "This will make possible closer cooperation in the operation of the entire field, and we feel will result in substantially greater ultimate production."

The properties consist of the northeast quarter of 29-21s-17e, M. D. B. & M., Fresno County; a natural-gas plant with a daily capacity of 40,000,000 cu. ft., and other production facilities.

THIS WEEK

EXTRICATION— Davies puts PAW on liquidation basis. . . . Predicts "wind up all barbed wire by end of year." . . . Many directives being canceled. . . . ¶ODT removes all curbs on moving oil products by tank car and truck. . . . ¶Rationing of 73 to 80-octane gasoline discontinued by Civil Aeronautics Administration. . . . ¶Louisiana Natural Gas Conservation Committee asks to be dissolved. . . . Suggests functions be assumed by its chairman. . . . ¶End of gasoline rationing adds greatly to state revenues through upsurge in consumption and its contribution to tax receipts. . . . Touches off rush to service stations. . . . Suppliers hard pressed. . . . ¶All wartime restrictions on natural gas and gas-burning equipment lifted by WPB. . . . ¶Sun's Marcus Hook plant ready to convert immediately to civilian production. . . .

LEADERSHIP—American manufacturers expected to lead in development of postwar diesels. . . . Take initiative from Germany, where engine was invented. . . . Already superior to cumbersome prewar European type. . . . ¶Nation's shipyards built 579 tankers since outbreak of European war. . . . More than compensates for Allied loss through sinkings. . . . Now in dominant position in point of tanker tonnage. . . .

ACHIEVEMENT— Eight huge egg-shaped vaults cut out of solid rock at cost of $53,000,000 provided secret bomb-proof storage for oil products in Hawaii. . . . Just started when Japs struck. . . . Rushed to completion. . . . Utilizable now as Navy oil-storage depot. . . . ¶British pilot invents jet-propelled automobile, the "Bomb." . . . Hopes to push speed record to 520 miles an hour. . . . Built on lines of German V-2 rocket. . . . ¶Atomic energy may make natural gas and other fuels obsolete before reserves are depleted, says executive director of I.N.G.A.A. . . . "Complete answer" to those who urge hoarding of gas. . . . ¶Sinclair develops process for producing organic nitrogen compounds by direct amination of olefins. . . . Of importance in pharmaceuticals, insecticides, etc. . . . ¶PAW reveals 130-octane gasoline already in production. . . . Rating of 100 was good in early days of war. . . .

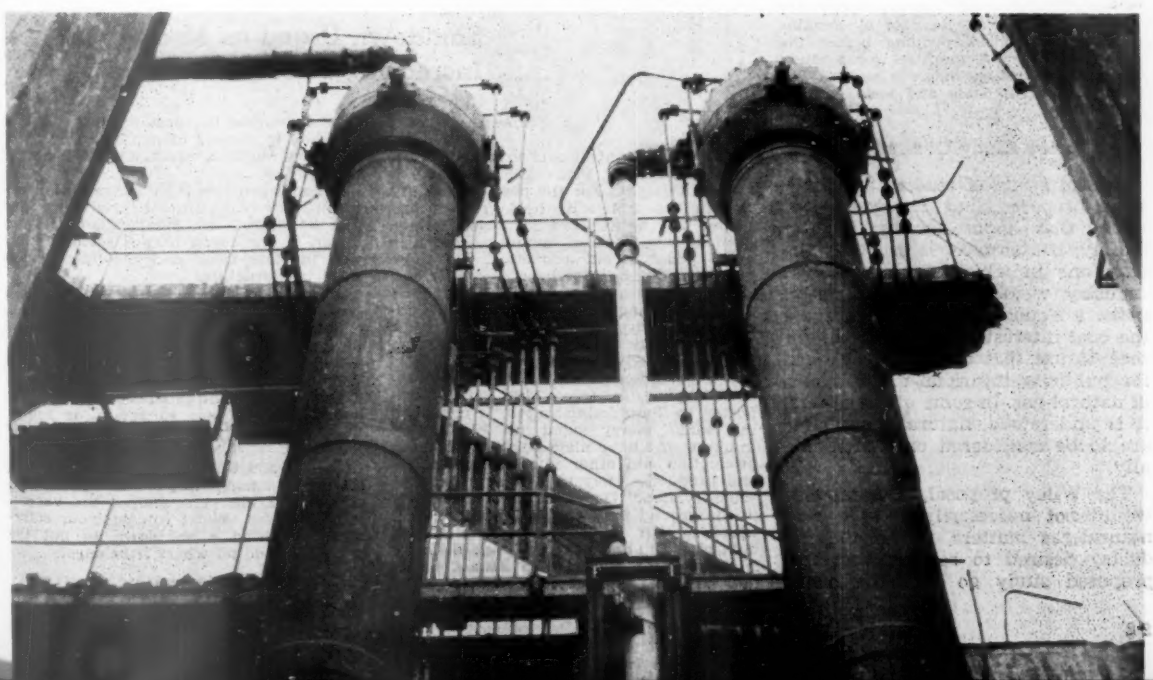
TENSIONS— State Department says first test of ability to work with Russians will come in settling eastern European oil problems. . . . ¶Unionization of oil and allied industries disturbed by return of servicemen looking for jobs. . . . Misfits and incompetents likely to be weeded out. . . . ¶Saudi Arabian Government notifies American oil companies it opposes laying of pipe lines in territory not exclusively Arabian. . . . Suggests Gaza as Mediterranean terminus. . . . ¶Texas Mid-Continent Oil and Gas Association urges immediate 1-cent increase in gasoline price to provide 35-cent raise for crude. . . .

PRODUCTION— National output drops 950 bbl. from preceding week to daily average of 4,982,650. . . . California down 7,800 Kansas up 7,450. . . . ¶Completions continue recession, total of 578 comparing with 514 the week before. . . . Last year's total, 495. . . . ¶Recent congressional guarantee of tax-free deductions of intangible drilling costs expected to prove a mildly stimulating influence. . . .

TIRES— Navy to release 100,000 tires within 60 to 90 days. . . . Mostly "mud and snow" type. . . . ¶Motorists assured should be able to buy unrationed tires before year's close. . . . ¶Our huge synthetic-rubber capacity, small foreign capacity, and immense world production of natural rubber expected to provide 2,800,000 tons to meet 1,500,000-ton yearly demand. . . .

These converters 6 ft. in diameter and 70 ft. high were found in a hydrogenation stall at Galesenberg, Germany, where coal paste is liquefied into oil products at the extraordinarily high pressure of 10,000 psi. Plant construction plans are being microfilmed and brought to this country for study

Acme Photo



Eight Natural-Gas Investigations Loom as Possibilities

WASHINGTON.—The natural-gas industry could be involved in as many as eight different investigations by congressional and federal agency groups simultaneously this winter. This is not probable, but it is a possibility as the result of recent congressional activity.

Here is the list:

1. The FPC investigation, definitely scheduled to start at Kansas City, September 18.

2. The O'Mahoney committee of the Senate, which already has heard some natural-gas testimony and which will continue the hearings this fall and winter.

3. The proposal of Representative Lea, House Interstate and Foreign Commerce Committee, for a study of all methods of transportation, including natural-gas pipe lines. This is pending before the House Rules Committee.

4. The proposal of Senator Guffey for a study of reserves of mineral resources, including natural gas. This is pending before the Senate Mines and Mining Committee.

5. A resolution (S. Res. 161) by Senator McFarland of Arizona, already approved by the Senate Interstate Commerce Committee and awaiting action by the Senate Audit and Control Committee, for a study similar to that proposed in the Lea resolution.

6. A resolution (S. Res. 167) by Senator Stewart of Tennessee, pending before the Senate Military Affairs Committee, for a study of depletion of domestic supplies and raw materials, including natural gas.

7. A resolution (S. Res. 168) by Senator Mead of New York, pending before the Senate Interstate Commerce Committee, for a study similar to that proposed by Representative Lea and Senator McFarland.

8. A resolution (S. Res. 24) by Senator Wiley of Wisconsin, pending before the Senate Judiciary Committee, for a study of interrelationships between powers and work of federal, state and local governments.

Guffey Study Outstanding

Of the group of studies that have been proposed, but not yet acted upon, that sponsored by Senator Guffey, if approved, is probably the only one in which the natural-gas industry would be called upon to make a detailed presentation, since the coal interests conceivably might seek to use that as the springboard for publicity injurious to the cause of natural gas. In some of the others, it is understood, natural-gas phases are to be considered only incidentally.

The Wiley proposal, if approved, would not necessarily include any natural-gas matters, unless the industry desired to request that the proposed study go into the overlapping of federal and state authority over this industry.

The probability is that some of these resolutions will never be acted upon by the committees to which they have been referred, but the industry should watch the progress of all of them and be ready to present a strong case if the necessity arises.

Refiners Under Safety Law Attorney General Rules

OKLAHOMA CITY.—Oklahoma refineries making and distributing liquefied petroleum gas come under the safety control law passed by the 1945 legislature, according to a ruling of Attorney General Randell S. Cobb. In an opinion asked by T. J. Ellis, state fire marshal, the attorney general held that Continental Oil Co., Ponca City, was subject to the new law and must pay $25 for an inspection certificate.

Inspections of refineries manufacturing liquefied gas products will be made by the state fire marshal's office. The companies are required to pay the fee and obtain the certificates before September each year.

Rationing of High-Test Fuel Discontinued by CAA

WASHINGTON.—Civil Aeronautics Administration has announced discontinuance of rationing of all 73 to 80-octane premium-grade gasoline for aviation purposes. Dealers at airfields throughout the country who distribute this type of motor fuel were notified by wire of CAA's action. CAA acted for Office of Price Administration in rationing gasoline for private flying.

Military Forces to Buy 100-Octane Direct

WASHINGTON.—Most future 100-octane gasoline buying for military forces will be handled directly with suppliers by the Army and Navy. The Office of Defense Supplies, the government agency to which most petroleum war plants had contracted supplies, last week canceled most purchase agreements.

Some of the plants, it is expected here, will be forced to discontinue operations temporarily until regular contract relationships can be established with the Navy and War departments. The ODS cancellation of contracts does not mean, however, that 100-octane production will necessarily end at the plants receiving termination notices for substantial quantities of aviation fuel will be needed by occupation forces and military transport.

What Others Say

Shutdown Urged as Means of Increasing Price of Crude Oil

Shawnee, Okla.

Dear Sirs:

The end of control over crude oil prices by the Office of Price Administration is not yet in sight. For the past 4 years this bureau has arbitrarily held crude prices below 1937 figures and far below parity, even in the face of mounting costs in every phase of oil production. The independent producer has been the chief sufferer, not the major integrated companies with their long profits on refined products and cost-plus government contracts.

The domestic oil producer is now faced with continued low crude prices and also the importation of cheap foreign oil almost import tax free. This policy, supported by the administration, is urged by the same merry band of Washington thinkers who have played hobb with meat production and other vital raw materials and products. They urge it as a form of "conservation." Domestic oil is to be left in the ground for some future emergency while foreign fields are to furnish the bulk of the nation's needs. Their memory is short indeed when they cannot recall the position this country would have been in during the past 4 war years if it had had to depend upon foreign crude or on a few major companies to do the wildcat drilling.

A continued low price for crude oil can mean only the ultimate ruination and elimination of the independent oil producer. It can mean only a severe reduction in state taxes and the upsetting of state tax structures.

A 2-weeks shutdown in 1938 of almost every producing well in the United States stopped an attempt by certain crude-oil purchasers to depress the price of oil to a subnormal figure. It is obvious that the same procedure must be resorted to now if the independent producer is to survive and the States are to retain or regain their sovereignty over their own natural resources.

The Oil and Gas Journal wields a strong influence among large and small producers and the personnel of the various state agencies. Won't you put your active support behind a shutdown to put the price of crude oil where it belongs?

CHARLES F. BALPH.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Moment of Opportunity

REHABILITATION of producing, manufacturing, and transportation facilities and restoration of oil reserves become the immediate postwar job of the industry.

There can be no doubt that plants and properties have suffered severely from war-emergency demands. Military and essential civilian requirements pushed operations to successively higher peaks. Accelerated depreciation was inevitable under the exigencies of war.

In performing its duty to the fullest, the industry never questioned the necessity of doing with the least possible expenditure of critical steel. The result was that operators were guided solely by availability in installations of new equipment. Old facilities were maintained in operation long beyond their efficient service life.

The time is here, however, for careful scrutiny of the peacetime requirements. The transition period well may be considered an era of grace, permitting the industry to set its operational sights on the bigger job ahead. It can ill afford to rest on its laurels, albeit they are brilliant, innumerable and fully deserved.

Postwar problems will not solve themselves. The breathing spell between now and new records in petroleum demand will be short. It can be used wisely in preparing for the more exacting peacetime requirements. It could be wasted to the lasting disadvantage of the industry and its component units.

Intelligent use of the temporary lull in consumption will be reflected in numerous ways. Conditions will permit more thorough examination of prospective producing structures. Drilling equipment may be improved to meet the more severe conditions accompanying depth and harder formations. Refineries which were strained to the breaking point may be rehabilitated and modernized. The pipe-line transportation system, especially of product carriers, should be improved to the highest practical economic level.

Top attention should be devoted to crude-oil reserves. The current ratio of 11.5 between production and reserves is the lowest in history. Reduced rate of production over the next 12 to 18 months will modify this unhealthy relationship. The fact is glaringly obvious, however, that the discovery rate must be improved. The domestic industry should aim at proven reserves of 25 to 30 billion barrels by 1950.

Immensity of the task is best shown by history. Newly discovered reserves have failed to equal production in every year since 1940. Productive capacity of 5 million barrels daily may prove highly deceiving and give the industry a false sense of security. Numerous qualified oil men are extremely doubtful that the peak rate could have been sustained if the war had continued another year. Maximum efficient rates of production were exceeded by practically every field in the country during the last 6 months of the conflict.

Manufacturing facilities, with exception of war plants, are in more serious need of rehabilitation than any other branch of the industry. Carbon steel and special alloys are now available, or will be soon for the necessary modernization program.

This is the time, consequently, for all branches of the industry to recognize the exacting conditions of the future and to build accordingly.

XUM

K. S. ADAMS

D. R. KNOWLTON

F. W. FLOYD

M. P. ISENBERGER

Phillips Starts Operations in Venezuela

by Marian Cody

CARACAS. — The Phillips Venezuelan Oil Co., wholly owned subsidiary of the Phillips Petroleum Co., has started operations in eastern Venezuela in the States of Monagas, Anzoategui, and Guarico. The new company was legally domiciled in Venezuela in the summer of 1944, following a 2-year survey of various phases of the petroleum industry.

During the first half of 1945, five concessions were acquired by Phillips totaling approximately 738,036 acres (298,800 hectares) of exploration concessions and 131,567.02 acres (53,266 hectares) of exploitation concessions.

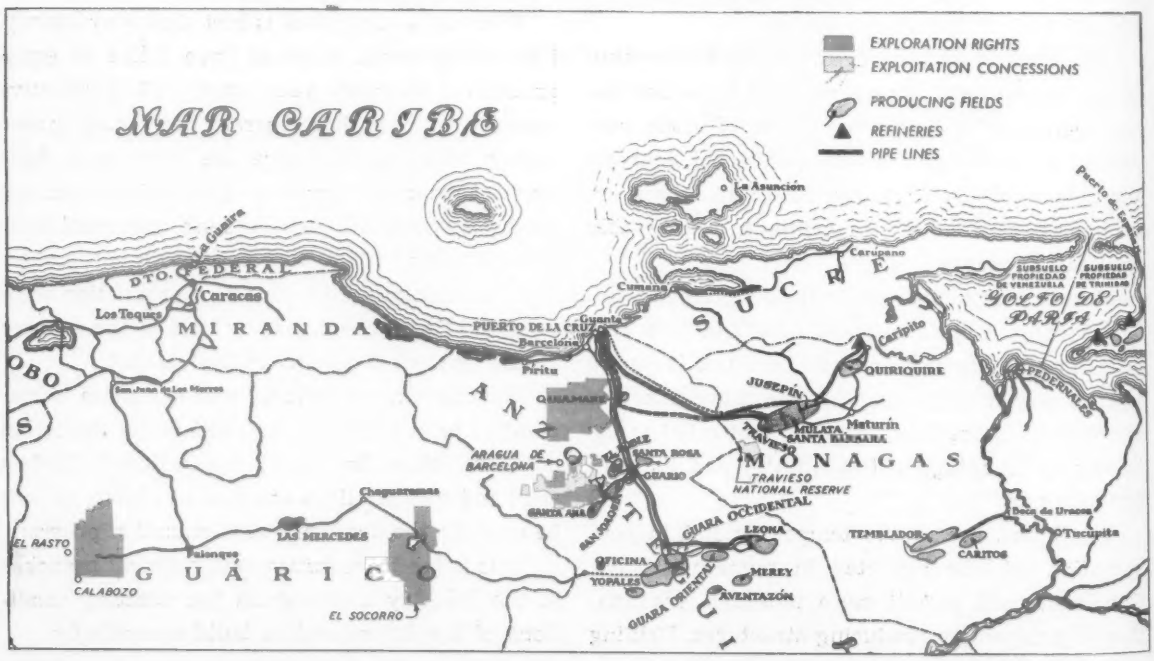
The concession in the State of Monagas, referred to by the company as the Travieso block, comprises 25,851.02 acres (10,466 hectares) of exploitation land. This block is on trend with the Jusepin, Mulata, Santa Barbara fields. Phillips is now making core-hole investigations in this area and expects to commence drilling operations soon.

Two concessions have also been granted the company in the State of Anzoategui. Concession "A" is located near the town of Barcelona, is exclusively exploration land and covers 222,300 acres (90,000 hectares). Concession "B", south of the town of Aragua, combines exploration and exploitation territory of 176,852 acres (71,600 hectares). Two geological surface parties are now working on these two concessions. Immediately following this preliminary reconnaissance, two seismograph and three gravity-meter crews will be sent into the the area.

Eventually these geophysical parties will be moved to the Guarico area. The Guarico concessions "C" and "D" together total 444,600 acres (180,000 hectares).

Temporary field headquarters have been established in Barcelona. Eventually the company expects to

Phillips' concessions are well scattered through eastern Venezuela as shown by map



M. K. NEPTUNE C. P. BONG H. R. HUNTER DR. PEREZ DE LA COVA STEWART BARCLAY

locate a permanent field office in Puerta La Cruz.

In addition to their Venezuelan activities, Phillips is at present organizing a Colombian company to be known as the Phillips Colombian Oil Co. Headquarters have already been established at Bogotá.

Key Men in Phillips Foreign Organization

K. S. Adams, president of Phillips Petroleum Co., has spent his entire business career in that company. He joined Phillips immediately after his graduation from the University of Kansas, and promotions carried him from assistant treasurer to treasurer, vice president, and then president, when Frank Phillips left that position to become chairman of the board. Because of his broad experience in petroleum gained in serving various field and office departments in Phillips, he was made chairman of the District 2 production committee in January 1944, having been a member of the committee since its inception in 1941.

D. R. Knowlton, executive vice president.—In addition to his duties as executive vice president of Phillips Venezuelan Oil Co., Knowlton is manager of the foreign department of Phillips Petroleum Co., with headquarters in Bartlesville. Previously associated with the Petroleum Administration for War as national director of production for a period of 2½ years. Author of numerous articles on well spacing and unit operation of oil fields. Graduate of the University of Colorado where he specialized in geology. Also graduate of Stanford where he received degree in engineering. Member of the American Petroleum Institute, the Independent Petroleum Association, and the American Institute of Mining and Metallurgical Engineers.

N. P. Isenberger.—Director of exploration for the foreign department of Phillips Petroleum Co. Serves the Phillips Venezuelan Oil Co. in an advisory capacity and was responsible for much of the preliminary investigation made by this organization in both Venezuela and Colombia. Graduate of Kansas, Bachelor of Science degree in geology. Member of the American Association of Petroleum Geologists.

F. W. Floyd, general manager.—Floyd was previously connected with the Creole Petroleum Corp. as head of the technical department. Prior to that time he was associated with the International Petroleum Co., Ltd., in Colombia and later with the Carter Oil Co. as vice president in charge of production with headquarters in Tulsa. Graduate of the University of Chicago where he specialized in geology. Received master's degree in civil engineering from the University of Missouri.

M. K. Neptune, assistant manager.—Associated with the Phillips Petroleum Co. since 1933 as petroleum engineer in the production department. Prior to his coming to Venezuela, Neptune spent 2½ years with the Petroleum Administration for War in Washington. Graduate of the University of Oklahoma in 1933 in engineering; 1937 in law. Member of the American Institute of Mining and Metallurgical Engineers. Registered professional engineer in Oklahoma.

C. P. Bong, chief geologist.—Associated with the Dutch Shell in Mexico from 1923 to 1925 and with the Lago Petroleum Co. in Venezuela from 1925 to 1930. Later associated with the Phillips Petroleum Co. as district geologist in Corpus Christi. Graduate of the University of Nebraska. Member of the American Association of Petroleum Geologists.

Stewart Barclay, chief geophysicist.—For the previous 8 years, Barclay has been associated with the Phillips Petroleum Co. as geophysicist, working in their various areas of operation in the United States, particularly in the Gulf Coast area. Graduate of the Louisiana State University. Member of the American Association of Petroleum Geologists and the Society of Exploration Geophysicists.

Dr. Perez de la Cova, chief of land division.—Formerly director of the Department of Concessions and Cartography, Petroleum Bureau of the Ministerio de Fomento, Venezuela. Civil engineer, Central University, Caracas; petroleum engineer, University of Tulsa. Member of the American Institute of Mining and Metallurgical Engineers and of the National Association of Engineers of Venezuela.

H. R. Hunter, chief civil engineer.—Twelve years service with Phillips Petroleum Co., principally in the Gulf Coast and Mid-Continent areas. Graduate of the University of Kansas.

More Than 93 Per Cent of Servicemen Back on Job

NEW YORK.—More than 93 per cent of the employes who left Standard Oil Co. (New Jersey) and its affiliates to enter war service, and have been discharged, are back at work again, Frank W. Pierce, director, says. In addition, the company has taken on some 2,000 returned veterans not previously employed by it.

"One out of every seven Jersey Standard employes went away to war, a total of more than 8,000," Pierce states. "Nearly a fifth have now been discharged from the services, and we feel gratified that such an overwhelming percentage have come back with us."

In each case of a returning veteran, Pierce said, either his old job or another comparable to it is immediately available to him. In addition, the company interviews each to learn what, if any, added skills and capabilities he acquired while in service, and these are taken into consideration in putting him on an available better job.

The company's program embraces a specific policy for the disabled veteran, providing training to equip him, if possible, for a job which he can perform.

XUM

INTERNATIONAL

Jap Oil Resources More Abundant Than Realized

Disclosure this week of details on Japan's oil fields, petroleum refineries, synthetic oil plants and chemical works by a Bureau of Mines resources map shows facilities in these categories to be more extensive than realized previously. Petroleum resources of Japan proper, the bureau's map study indicates, were still considerably below requirements for modern war.

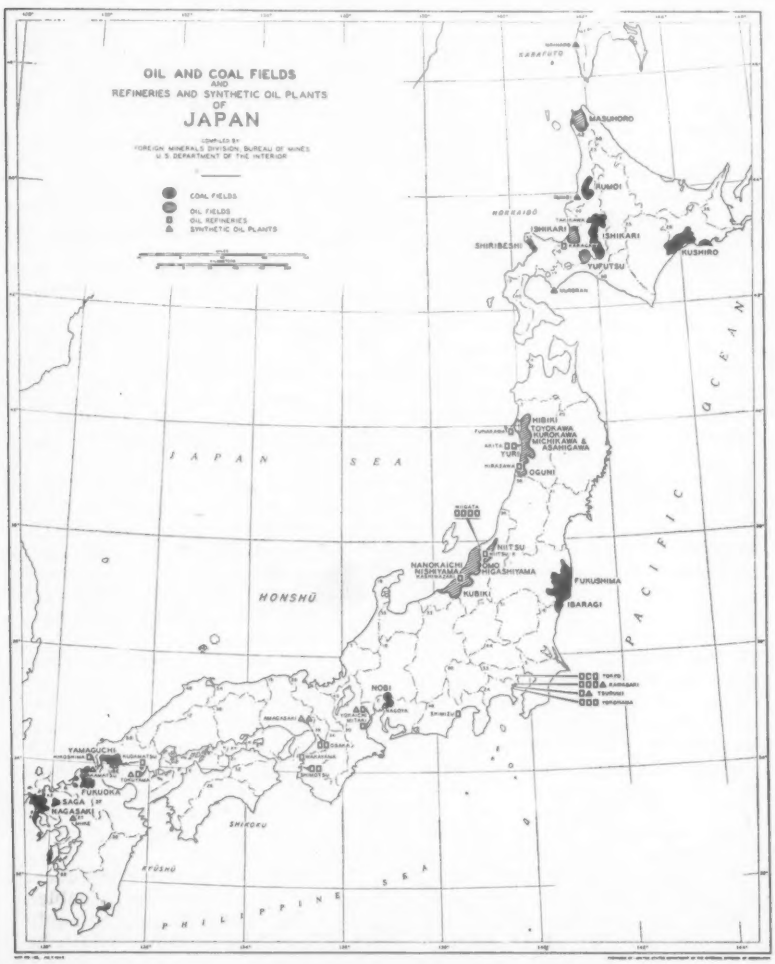
From the oil fields of Hokkaido, the northernmost of Japan's four larger islands, to the industrialized area around what was Nagasaki on Kyushu, the big southern island, the bureau's maps reveal the magnitude of the network of mines and plants that helped Nippon to fight a long war.

The information gathered by the bureau reveals that Japan proper contains a great variety of minerals, but the country is not adequately self-sufficient in any class to support the vast industrial state that had been established before and during the war, according to Dr. R. R. Sayers, director of the Bureau of Mines. Even with the addition of minerals from Korea, Manchuria, Formosa, and the mandated islands, Japan still was dependent upon other countries to keep its industrial machine working, he said.

Of the vital metals and minerals that make a modern industrial state, Japan did not have enough. These included the ferrous metals, copper, zinc, lead, bauxite, petroleum, mica, mercury, tin, and many others.

Oil and coal fields, refineries and synthetic oil plants, iron and steel plants, smelters, metallurgical plants and chemical works are shown on the maps.

Many federal agencies have contributed to the enormous store of knowledge about Japan and her mineral industries. The work was done as a part of the Foreign Minerals Division's regular surveys of the mineral resources of various foreign countries. Dr. Sayers and J. S. McGrath, chief of the Foreign Minerals Division, listed as collaborating agencies the State Department, the Foreign Economic Administration, Office of Strategic Services, Bureau of Foreign and Domestic Commerce of the Commerce Department, and the United States Board on Geographical Names.



Abnormal Demand Boosts Creole's Crude Production

Abnormal war demands for Venezuelan crude oil during the first 6 months of 1945 resulted in net production by Creole Petroleum Corp. of an average of 409,000 bbl. per day during this period, A. T. Proudfit, president of the company, announced last week.

This figure, which includes purchased royalty oil, compares with 347,000 bbl. per day for the first 6 months of 1944. Consolidated net income for the first 6 months of 1945 amounted to $1.41 per share or a total of $37,500,000 on 26,606,610 shares outstanding on June 30. This compares with $31,800,000 or $1.19 per share for the corresponding period of 1944. It is estimated that Creole will reinvest approximately $35,000,000 of current net income in drilling and development expenditures during 1945. Selecting of Port Turiamo, pending approval of the Venezuelan congress, as the site of a new refinery, and the first discovery of oil on new concessions in eastern Venezuela was also reported.

Sixth Dificil Well Sets Production Record

Shell Oil Co. of Colombia 6 Dificil has established a new producing record for completions in that Colombian field which is about 90 miles from La Gaira, a port on the Caribbean. The new producer, which is 1,000 meters west and 500 south of the 1 Dificil discovery well, was completed for 1,200 bbl. a day of 42° A.P.I. gravity crude on a ⅜-in. choke. Tubing pressure was 1,400 psi. and casing pressure was 2,400 psi.

The Dificil field currently contains five completed producers with combined potential of 2,750 bbl. per day. Completion depth averages around 5,800 ft. The company is planning expansion of its development program in an effort to justify a pipe-line outlet.

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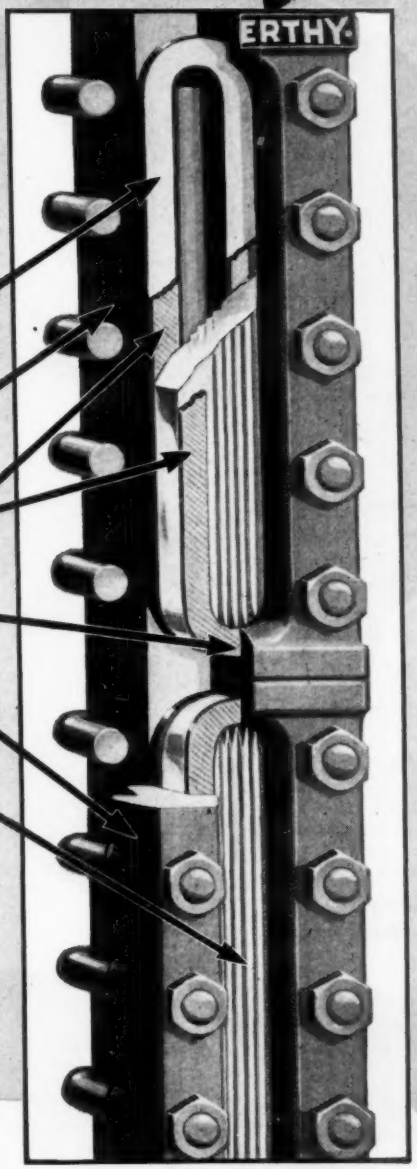

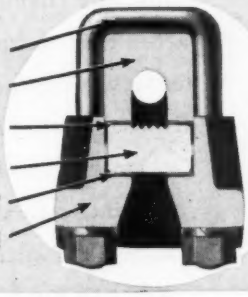

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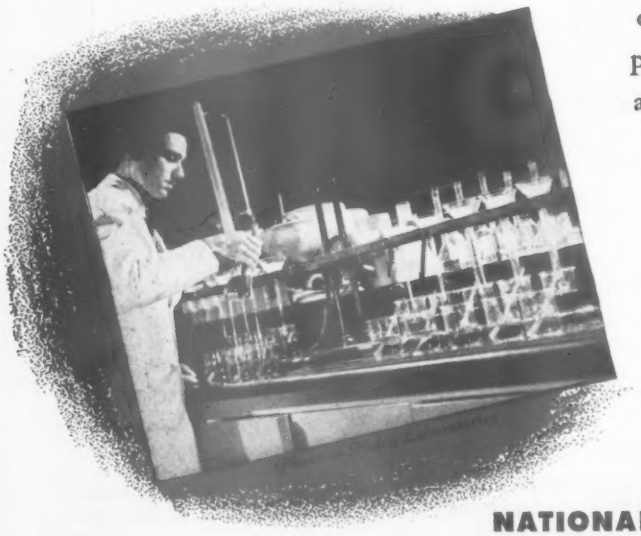

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Few Major Secrets of Oil's Role in War Remain Untold

WASHINGTON. — The oil industry's part in helping to win the war has been so well told that few major secrets remain to be disclosed now that censorship and military security rules have been dropped.

Two strictly military projects which may now be discussed should be of considerable interest to the oil industry.

One of these is the tremendous underground oil storage built in Hawaii. Part of this project had been barely started just before the Japanese struck on December 7, 1941, and it was rushed to completion at a cost of $53,000,000 to provide bomb-proof storage for several million barrels of petroleum products. This storage consists of a series of vaults cut out of solid rock and lined with concrete and steel, each with a cubic area equivalent to that of a large office building. It was a major engineering feat, unlike anything else in the world. More than 3,000 workmen were engaged in the project, and 1,100 hard-rock miners were imported from the mainland for the job. A 36-in. conveyor belt more than a mile long carried the lava rock out to a crusher, and sale of this rock more than paid for the belt and crusher.

One of Major Secrets

Because of the fear of bombing or sabotage, this storage was one of the major military secrets of Hawaii. The entrance was purposely inconspicuous and was ostensibly unguarded through actually highly protected. Underground pipe lines from the docks lead into a tunnel and back to a huge pump room carved out of the solid rock. Here are electric pumps and the most modern control system with dials showing the storage in all the tanks and the operation of all the pipe lines and pumps. Dockside tankers pump directly into surge tanks in this pump room, and from there an intricate pumping system delivers the oil to the main storage tanks far back in the mountain. The grade is such that the entire storage may be emptied by gravity. Throughout the war this storage has had more oil in it than the entire Navy used in any peacetime year, and it may always be used as an important Navy oil-storage depot.

Another secret military project of probable postwar use is the series of oil pipe lines across the Isthmus of Panama to permit Caribbean oil to reach the Pacific without moving tankers through the Panama Canal. This system consists of two 20-in. black oil lines with capacity of 160,000 bbl. per day each, a 10-in. diesel oil line with capacity of 84,000 bbl. per day, and a 12-in. gasoline line with capacity of about 100,000 bbl. per day. In addition, tremendous storage was built at Balboa where tankers loaded for movement to the fleet and to military installations throughout the Pacific.

For months many "now it can be told" incidents will be coming to light about how a few carloads of oil arrived just in time to win a battle or prevent an industry shutdown, or how equipment was improvised, borrowed, or stolen to do the impossible in refinery or pipeline construction. Further details on wartime progress in refining technology may now be published, and individual companies can tell more about their new plants and processes and the new petroleum products they have developed.

But there are no big secrets comparable to the atomic bomb or radar which have been kept completely under wraps.

The public has been told considerable about the quantities of 100-octane gasoline produced, the difficulties of making it, and its importance in bringing victory, and even a little bit about the new superfuel with specifications above 130 performance rating which was just at the point of being produced in quantity.

Many New Products

Also about the jellied gasoline which made possible the fire raids which wiped out such large portions of Japan's industrial cities and which improved the performance of flamethrowers many fold. And the fog oil and smoke generating machines developed by the oil industry which shielded military and naval operations from enemy observation.

The story of the "big inch" and other pipe-line projects has been well told, and much has also been released about military pipe lines, built with the aid of industry men, such as the world's longest across Burma and into China, and the many military pipe lines in Europe and on other fighting fronts.

There is nothing secret about the oil industry's greatest contribution to winning the war—the unique Government-industry partnership under which all companies in the industry pooled their brains, their manpower, their resources, and placed them at the disposal of the Government. Oil companies exchanged technical information and physical facilities, engaged in research on military problems, loaned experts to the Government, and carried out all tasks assigned to them.

It was such team-work that made possible the development and mass production of super-100-octane aviation gasoline, synthetic rubber, incendiary bombs, artificial fog, and many new specialty petroleum products such as all-purpose fuels and lubricants, aviation lubes, greases, solvents, protective coatings, rust preventatives, insecticide carriers, and others. Without this type of cooperation it would have been impossible to produce the quantities of crude oil needed by the military, to build and convert pipe lines for military use, to keep all refineries running at capacity, to spread supplies so that all essential uses were met, and to do all the other things necessary to win this "oil war."

The oil industry's part in the war is a long and dramatic story, but other than some details of production figures and technical processes it contains no major secrets which have had to be kept quiet for reasons of military security.

Production of 130-Octane Gasoline Is Disclosed

WASHINGTON.—Petroleum Administration for War discloses that this country has produced an aviation gasoline with an octane rating of 130. The revelation came about in connection with revocation of a series of orders affecting the refining industry.

In order to assist in orderly disposition of available supplies of finished aviation gasoline of "higher than 130 octane rating the Army petroleum allocations committee will continue to allocate these fuels," a PAW announcement says.

The fact a "super" fuel was in production was no secret, but there had been no previous intimation as to how powerful it was. An octane rating of 100 for aviation fuel was regarded as good early in the war.

Hearings Scheduled on Public-Land Leasing Act

WASHINGTON. — A subcommittee of the Senate public lands committee has scheduled public hearings in Casper, Wyo., August 27, and Denver, Colo., August 30, on the bill introduced by Sen. Joseph C. O'Mahoney to amend the federal leasing laws to provide more liberal royalty and other provisions for developing oil on the public domain.

WPB Surrenders Control Over All But Scarcest Commodities

WASHINGTON.—Many of the materials needed in routine and rehabilitation operations of the petroleum industry were freed this week by action of War Production Board. Approximately 210 orders controlling industrial materials were canceled, leaving 125 applicable chiefly to scarce commodities. Other controls will be abolished as the supply permits. Thus, manufacturers of oil-country materials were given the "go-ahead" signal, returning the relationship with operating companies to a peacetime basis. Both suppliers and operators launched immediately into the necessary adjustment of relationships.

The steel industry reported some cancellation of excessively long-term orders which had been placed by large consumers as a routine wartime practice. Much of this type of cancellation, however, had been anticipated and caused no concern.

In effect WPB revoked all possible controls, retaining only those which will be necessary to prevent industrial dislocation and bottlenecks which might prove harmful to reemployment and to assure stabilization. J. A. Krug, WPB chairman, stressed that even the controls which are being retained are only temporary and that others will be dropped as rapidly as possible.

The high points of the WPB action are as follows:

1. WPB cancels 210 wartime control orders.

2. Release of a huge industrial building program through a plan to relax industrial-construction controls. This plan, designed to absorb the manpower and materials freed by military cutbacks, is already in effect and additional relaxation will be considered within 30 days.

3. Remove ceilings on production of automobiles and other consumers' durable goods. These important industries may now move forward with all-out production programs.

4. Orders controlling materials that are still in short supply, tin, crude rubber, textiles, lumber, etc., will be retained until shortages ease or until there is no longer any danger of a scramble.

5. Inventory controls will be retained until the danger of hoarding, preemptive buying and stockpiling by the few at the expense of the many are over.

6. Preferential protection of small business ($50,000 or less per quarter) including the rating system will remain in effect for the time being until the effects of cutbacks can be appraised and it is safe to remove them.

7. WPB will retain its powers for breaking bottlenecks or giving protection where needed to military or highly essential civilian or export needs. These powers will be used only where necessary and business should not rely on priorities help for conducting its normal activities.

8. In line with the president's letter to the WPB chairman, the board will take vigorous action to expand production of materials which are in short supply to meet civilian demands and will work with OPA, WMC and other agencies whose operations are of equal importance to the rapid expansion of such production.

Antitrust Cases Due For Immediate Trial

WASHINGTON.—The Justice Department announced that Army and Navy have withdrawn requests not to prosecute antitrust cases which might conflict with the war effort, thus freeing 25 cases for immediate trial.

The list does not include the "Mother Hubbard" case against American Petroleum Institute and all major oil companies filed in the District of Columbia September 30, 1940, because trial of this suit was postponed at request of Interior Secretary Ickes. Justice probably can proceed with this case without withdrawal of Ickes' request because a court order deferring filing of answers by defendants provides that justice shall give 60 days' notice of motion to require answer.

Justice officials say they have no immediate plans for reviving the A.P.I. case but it could come up for consideration at any time. Because of the many corporate changes in the oil industry during the past 5 years it is probable that a new bill of complaint would have to be drawn to list defendants and their subsidiaries properly.

DEATHS

Robert S. Ellison, 69, president of Stanolind Pipe Line Co. when he retired 5 years ago, died August 16 in Manitou, Colo. Ellison was a graduate of Indiana University school of law, practiced for a short time in Colorado Springs and in 1911-12 served in the Colorado legislature. Moving to Casper, Wyo., he joined Midwest Refining Co. and became its vice president. When Midwest was acquired by Stanolind Oil & Gas Co. in 1932 he was sent to Tulsa, where he became president of the pipe-line company.

Charles W. Douthit, 40, leaseman in Pennsylvania oil fields, died August 11 in Bradford, Pa.

Eric P. Swenson, 90, formerly a director of Pacific Oil Co. and former board chairman of The National City Bank, New York, died August 14 at his summer home in Upper Saranac Lake, N. Y.

George W. Kinney, 68, independent oil producer, died August 16 in Tulsa. Kinney joined Gulf Oil Corp. in Texas in 1903 and later went to Tulsa with that company. He supervised construction of Gulf's first pipe line in the Glenpool field. Later he was head of production for the Charles Page interests. In 1933 he was named assistant state proration officer for Oklahoma.

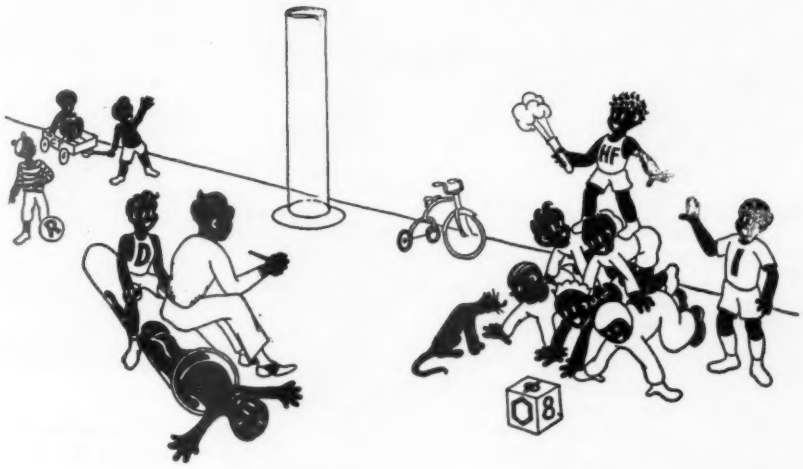
Arthur G. Bailey, 60, formerly superintendent of the old Lake Park Oil Co., died August 18 in Tulsa. At the time of his death he was sales manager for Fred E. Cooper, distributor for Allis-Chalmers Manufacturing Co.

Frederick C. Eaton, 82, retired oil producer and refiner, died August 14 in Warren, Pa. When the Wilburine Oil Works was established in Warren, Eaton, who had been employed by Empire Oil Works and Glade Oil Works in that city, was made superintendent. He continued in the management of that plant, along with the Butler, Pa., refinery of Valvoline Oil Co., until his retirement in 1928. For many years he was an independent oil producer, and he made important contributions to refining processes, especially in the field of filtration. He was among the first in the Glade area to experiment with repressuring for oil recovery.

John R. Healy, 59, vice president and general manager of Zero Hour Bomb Co., died August 17 in Tulsa. Healy formerly was associated with E. T. Williams Oil Co., in Casper, Wyo.

A. F. Cameron, 44, senior accountant for Shell Oil Co., Inc., in Houston, died August 11 of a heart attack.

Tom L. Speed, 33, petroleum engineer, was killed when a gas-well temperature-survey device exploded in an Andrews County, Texas, gas field.



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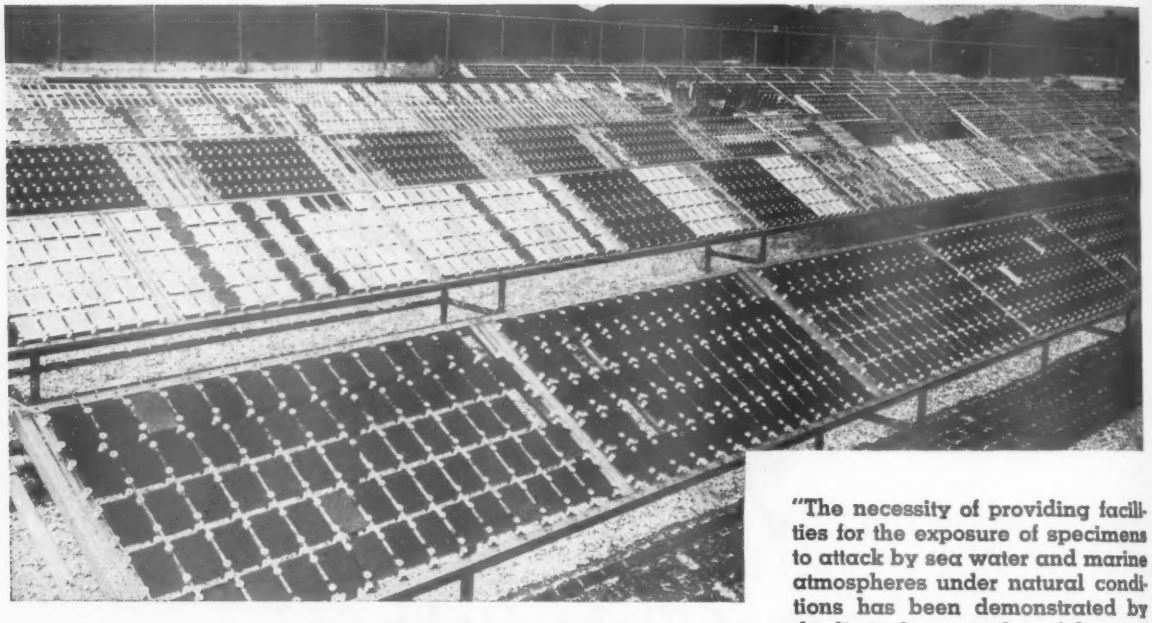


View of atmospheric test specimens at marine-corrosion testing station

Marine-Corrosion and Cathodic-Protection Tests At Kure Beach Station

by Fabian R. Staley

"The necessity of providing facilities for the exposure of specimens to attack by sea water and marine atmospheres under natural conditions has been demonstrated by the limited practical usefulness of laboratory tests on relatively small specimens in simple salt solutions, synthetic or reconstituted sea water, or in salt spray boxes. Laboratory tests provide a valuable supplement to tests under natural conditions—particularly in the preliminary investigations and in throwing light on the mechanisms of sea water corrosion and the factors that control it."

F. L. LaQue

SPECIMENS have been submitted by almost all producers of ferrous or nonferrous metals and alloys in this country to the Kure Beach marine-corrosion-testing station. It is located on the site of Ethyl Dow Chemical Co., near Wilmington, N. C., on the Atlantic coast, where chemicals are extracted from seawater. This location provides many advantages for testing the resistance of metals and alloys to corrosion in salt water and sea air. A continuous supply of full-strength sea water is available (temperature range 35° to 85° F.), free from industrial wastes, oil film, and other pollution that might interfere with testing. International Nickel Co. established the testing station in 1935 for the immediate purpose of comparing the corrosion resistance of low-alloy steels with carbon steel. Soon other materials were added to the list, and comparative tests were being made on all kinds of metals and alloys as well as metallic and organic coatings. Facilities for exposing specimens to atmospheric attack were provided in 1940. Carnegie-Illinois Steel Corp. and Dow Chemical Co., magnesium division, cooperated in setting up atmospheric test racks. The lot is located about 800 ft. from the ocean shore, and has room for 40 test racks each of which will support about 800 specimens. The racks face south and the specimen frames are set at 30° with the horizontal. All specimens are insulated from one another and from the rack by porcelain insulators.

Effects of atmospheric corrosion are measured by visual observation, by determination of weight loss, by changes in mechanical properties, or a combination of these. Usually a sufficient number of specimens are exposed originally to permit their withdrawal in groups of two or more at a time for the determination of corrosion rates. Standard steel and standard zinc test pieces are mounted with each group of specimens for calibration purposes, and to provide information on changes in the

Racks ready for tests at the testing station at Kure Beach, N. C.

corrosive action of the atmosphere from year to year that might be important in the interpretation of results over different periods.

Stress Corrosion

In addition to the tests made on the standard test panels mounted on the racks, weather-resistance tests are made on test pieces under stress. Specimens are loaded with weights or by means of springs; also bent test pieces are exposed on racks. Many kinds of welded seams are tested and the effect of annealing to relieve stress is demonstrated. Contact corrosion is studied by means of assemblies in which rivets or bolts of the same or unlike material are used to join the test plates. Some fabricated structures are exposed in the test lot so that design and methods of forming can be studied as factors in weathering.

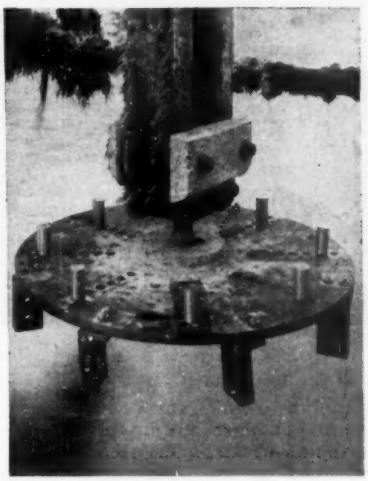
Numerous specimens of alloyed and metal coated steels have been exposed to the atmosphere here for as long as 10 years. Data obtained have been published in technical papers of scientific societies. A few of the results of a general nature will be mentioned. Stainless steel shows slight corrosion which does not increase over a long period of time. A considerable improvement in corrosion resistance results from the presence of as little as 0.05 per cent copper—larger amounts of copper effect little further improvement. This requires the addition of nickel or chromium. A chrome content below 18 per cent does not prevent rusting.

Galvanized steel sheet resists corrosion in proportion to the weight of zinc applied. Maximum protection is obtained with about 1.5 to 2 oz. per sq. ft. Aluminum-coated specimens show no corrosion after 4 years' exposure to the atmosphere. Lead-coated sheets require about .002 in. of coating for protection. Platinum is superior to palladium as a protective coating.

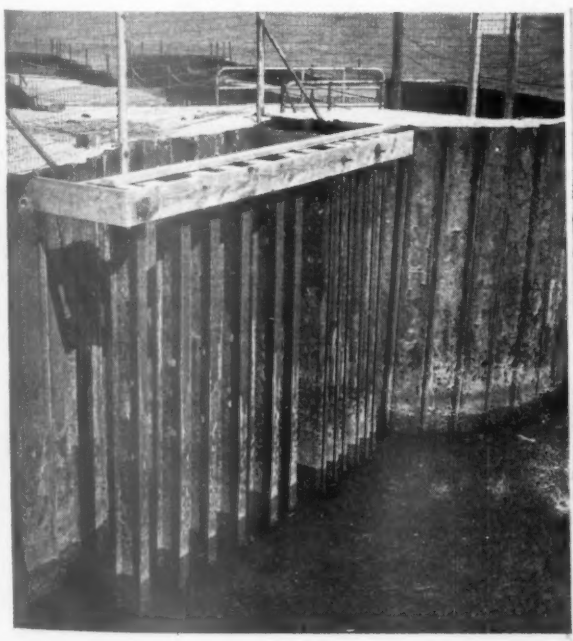
More than 5,000 test specimens of magnesium alloys are exposed to the atmosphere in the test lot. Also a number have been exposed for years on a rack just 80 ft. from the ocean where they encounter salt water spray. The magnesium specimens include sheet, extrusions, castings, die castings, and structures. Under these conditions Dowmetal alloys of the controlled purity type are comparable to aluminum alloys 3S and clad 24ST. The bare alloys are better than unprotected mild steel and galvanized iron. Tests of bare metal assemblies indicate severe galvanic corrosion between magnesium alloys and either copper or steel, but much less attack in contact with aluminum, galvanized iron, or zinc.

Sea-Water Tests

Sea water is pumped from the ocean into a large reservoir pond, and the water flows from here through a channel into the chemical plant. This channel through which a continuous current of clean sea water flows at a velocity of 2 ft. per second provides an ideal test basin. Specimens are exposed on racks immersed at a depth between 3 and 4 ft. Most of the racks are made of monel or an alloy of 70 per cent copper and 30 per cent nickel, and they are welded with monel rod. Specimens are fastened to the racks with monel machine screws, and galvanic action is prevented by the use of bakelite insulating tubes and washers on the screws. The absence of galvanic action on specimens of aluminum, magnesium, and zinc-coated steel has demonstrated the effectiveness of the method. A special apparatus is used to test the ability of alloys used in the manufacture of condenser tubes, pump impellers, and propellers to withstand severe erosive effects encountered in service. It consists of a

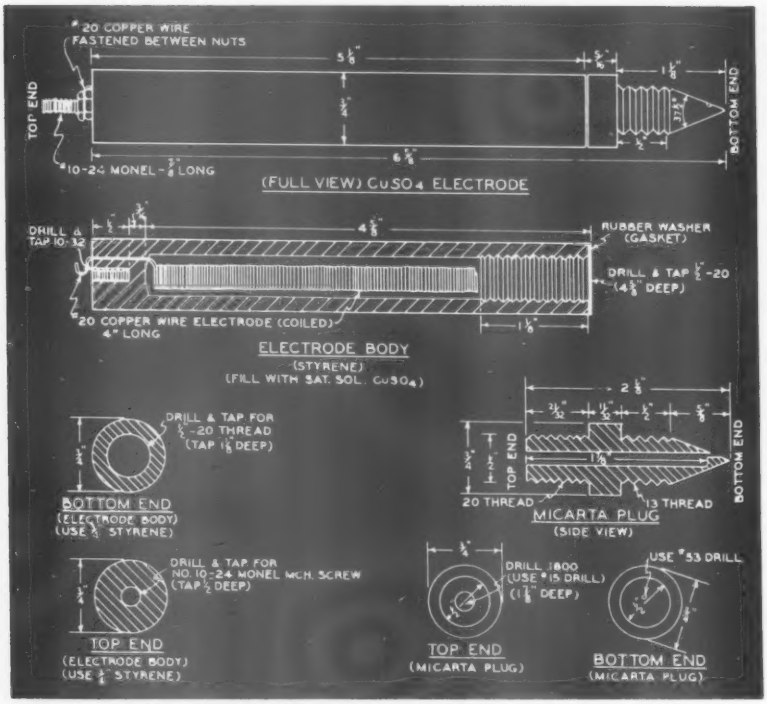


Erosive as well as corrosive conditions encountered in condenser tube and other services involving turbulence are studied. The submerged disk, bearing specimens, revolves continuously at 200 r.p.m.



Steel-piling test specimens at intake basin

Rack taken out of water


#20 COPPER WIRE FASTENED BETWEEN NUTS
TOP END
BOTTOM END
#10-24 MONEL - ⅜" LONG
(FULL VIEW) CuSO4 ELECTRODE
DRILL & TAP 10-32
RUBBER WASHER (GASKET)
DRILL & TAP ⅝"-20 (4⅛" DEEP)
#20 COPPER WIRE ELECTRODE (COILED) 4" LONG
ELECTRODE BODY (STYRENE) (FILL WITH SAT. SOL. CuSO4)
DRILL & TAP FOR ⅝"-20 THREAD (TAP 1⅛" DEEP)
BOTTOM END (ELECTRODE BODY) (USE ¾" STYRENE)
20 THREAD
13 THREAD
MICARTA PLUG (SIDE VIEW)
DRILL & TAP FOR NO. 10-24 MONEL MCH. SCREW (TAP ½" DEEP)
TOP END (ELECTRODE BODY) (USE ¾" STYRENE)
DRILL 1800 (USE #15 DRILL) (1⅛" DEEP)
USE #53 DRILL
TOP END (MICARTA PLUG)
BOTTOM END (MICARTA PLUG)

CuSO4 electrode to measure solution potential for cathodic protection

monel disk, which can be submerged in the channel and revolved continuously at 200 r.p.m. All specimens mounted on the disk are properly insulated to prevent galvanic action. Condenser-tube alloys are tested in the form of short sections of tubes placed in brackets. As the disk revolves salt water passes through the tubes to be tested with great turbulence so that the corrosive effect is equal to any that might be encountered in condensers.

Long-time tests on carbon and alloy steels are run in the ocean at the sea-water intake basin on specimens as they might be used for bulkheads or steel piling. These include I-beams and interlocking piling sections. Each specimen is 36 ft. long, driven 20 ft. into the ocean bed, with the remaining 16 ft. extending through the water into the air so that they are exposed to tidal action. Corrosion is measured by micrometer readings taken around the peripheries of holes drilled through the metal for this purpose.

Extensive research work has been carried on at the station for studying the antifouling characteristics of metals, alloys, and protective coatings. The relationship between corrosion and fouling in sea water of copper-nickel alloys has been investigated by LaQue and Clapp.

The station is not operated for commercial testing but any person or company having a scientific interest in the resistance of metals and alloys to marine corrosion will find the experts of the participating companies in this research project wil ing to cooperate and to discuss the results of their numerous tests. Records are kept by the individual company conducting the test, and these are used as guides in developing alloys of the future since a balance of properties must be considered in the application of these materials.

Magnesium for Cathodic Protection

Magnesium anodes are installed for protection on the steel pipe line that carries sea water to the plant and also for the protection of the steel piling. This work is carried on in connection with investigations being conducted by Dow Chemical Co.'s physical research laboratory to perform under actual field conditions.

find out how magnesium anodes

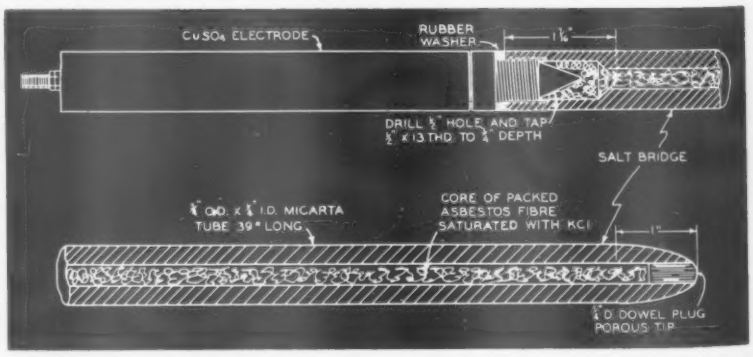
Cathodic protection is an electrolytic method of corrosion control that is used extensively for the protection of pipe lines and other buried structures. Corrosion can be greatly reduced by the use of an external anode which is consumed rather than the steel, being protected cathodically. The anodes are installed in the soil along the structure and connected to it by means of an electric conductor. Moisture in the earth surrounding the anode and the structure serves as an electrolyte to carry current from the magnesium anode to the surface of the buried steel pipe line, thus reducing the corrosion by sealing off oxygen by the formation of deposits developed by the current.

The position of magnesium in the electrochemical series indicates that it should be useful for cathodic protection of steel. Also it has a high electrochemical equivalent of 1,000 amp.-hr. per pound and solution potential to a copper sulfate reference electrode of from 1.8 to 1.7 volts depending upon the purity. Zinc has an electrochemical equivalent of 372 amp.-hr. per pound and a solution potential of approximately 1.1 volts.

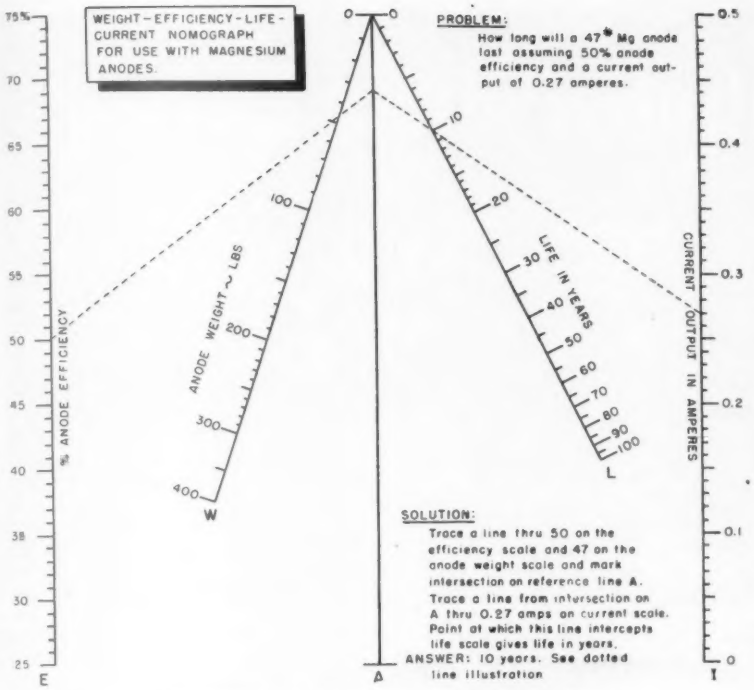
The efficiency and life of a magnesium anode has been found to depend essentially upon three factors. They are composition, backfill, and current density. Local cell corrosion is accelerated if the iron, nickel, or copper content exceeds a definite maximum. Local cell corrosion of the anode surface can be minimized by proper selection of the backfill material. Current efficiency increases with current density to a maximum value. The current efficiency is about 50 per cent at a current density of 200 milliamps per sq. ft.

Periodical tests made on the installations include:

1. Total current all anodes.
2. Current, each anode, others connected.
3. Current, each anode, others disconnected.
4. Current, each anode, without resistor, others disconnected.
5. Instantaneous open circuit po-


CuSO4 ELECTRODE
RUBBER WASHER
1⅛"
DRILL ½" HOLE AND TAP ½" ℄ 13 THD. TO ¾" DEPTH
SALT BRIDGE
¾" O.D. x ⅝" I.D. MICARTA TUBE 39" LONG
CORE OF PACKED ASBESTOS FIBRE SATURATED WITH KCl
1"
¾" D. DOWEL PLUG POROUS TIP

CuSO4 electrode, salt bridge assembly


WEIGHT – EFFICIENCY – LIFE – CURRENT NOMOGRAPH FOR USE WITH MAGNESIUM ANODES.
PROBLEM:
How long will a 47# Mg anode last assuming 50% anode efficiency and a current output of 0.27 amperes.
% ANODE EFFICIENCY
ANODE WEIGHT ~ LBS
LIFE IN YEARS
CURRENT OUTPUT IN AMPERES
SOLUTION:
Trace a line thru 50 on the efficiency scale and 47 on the anode weight scale and mark intersection on reference line A.
Trace a line from intersection on A thru 0.27 amps on current scale. Point at which this line intercepts life scale gives life in years.
ANSWER: 10 years. See dotted line illustration

Nomograph for determining current output, life, weight, or efficiency of magnesium anodes

tential, all anodes, to structure.

6. Instantaneous open circuit potential, each anode, to bus with other anodes operating.

7. Instantaneous open circuit potential, each anode, to bus with other anodes disconnected.

8. Instantaneous open circuit potential, each anode, to remote earth (solution potential).

9. Total potential, all anodes, to remote earth off and on.

10. Total potential, structure to remote earth, off and on.

Potential readings are taken by means of a $CuSO_4$ electrode placed adjacent to the structure under test through a 40-in. long salt bridge. This bridge is made from a ¾-in. textslite rod with a ¼-in. hole lengthwise through the center, packed with asbestos and saturated with KCl. The bottom end is sealed with a wooden plug and the electrode screws in the top end.

Accurate Record of Current Output

A special instrument is used for measuring the open circuit potential by opening the circuit about .01 second. This shows the effective driving potential of the circuit under operating conditions and the effective circuit resistance can be calculated from current flow measurements.

An accurate record of the current output is obtained from a multipoint recording potentiometer connected across a calibrated shunt in each circuit. Records show that magnesium has little or no tendency to polarize under normal conditions and that the current output changes only slightly with decrease in anode surface area. A 20-in. anode is rated at 8,000 amp.-hr. when operating at 50 per cent efficiency, and a 60-in. anode is rated at 23,500 amp.-hr. when operating at this efficiency.

The life of a 20-in. anode is about 10 years if operated at a current output of 90 milliamps or less providing an efficiency of 50 per cent is realized. A 60-in. anode will have the same length of life at 270 milliamps or less at 50 per cent efficiency. A special Dowmetal magnesium alloy has been developed to give a very high electrical efficiency for use in protective anodes. A 4-in. by 20-in. anode of this material weighs about 16 lb. and the 4-in. by 60-in. weighs about 47 lb.

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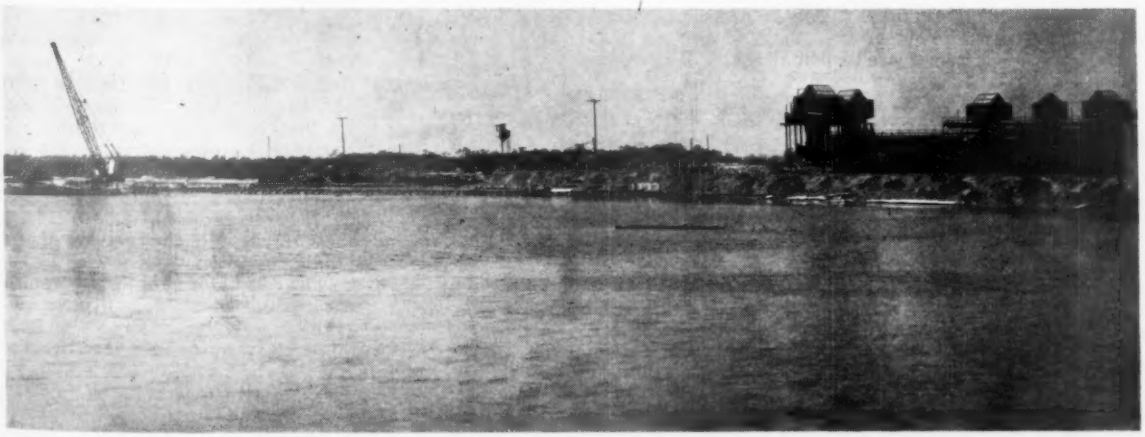


Sea-water pond, looking toward test racks

Flood Control at Krotz Springs

by E. H. Short, Jr.

Fig. 1—The scene ahead of the bulldozer is typical of the dense jungle growth which had to be cleared during the flood-control work in the Krotz Springs field

From dense jungle to a system of extremely well-built roads and dikes in a period less than 6 months is the record established at Krotz Springs. This project should serve as a guide to others in the coastal area when problems of a flood-control nature arise.

ONE of the most outstanding water-control engineering projects along the Gulf Coast was recently completed in the Krotz Springs, Louisiana, field by Gulf Refining Co.

With respect to the surface, Gulf Coast oil fields fall roughly into one of three classifications — dry land, water, or swamp. The latter classification may be defined as water operations by means of dredged canals, or a combination of land and water operations. With the completion of the road and dike system in the Krotz Springs field, it seems to fall into a new category. It is essentially a dry-land operation carried out in a swamp area. While the area is actually a swamp, its condition varies between two extremes, that of being comparatively dry at times, while at other times it may become a veritable lake on short notice.

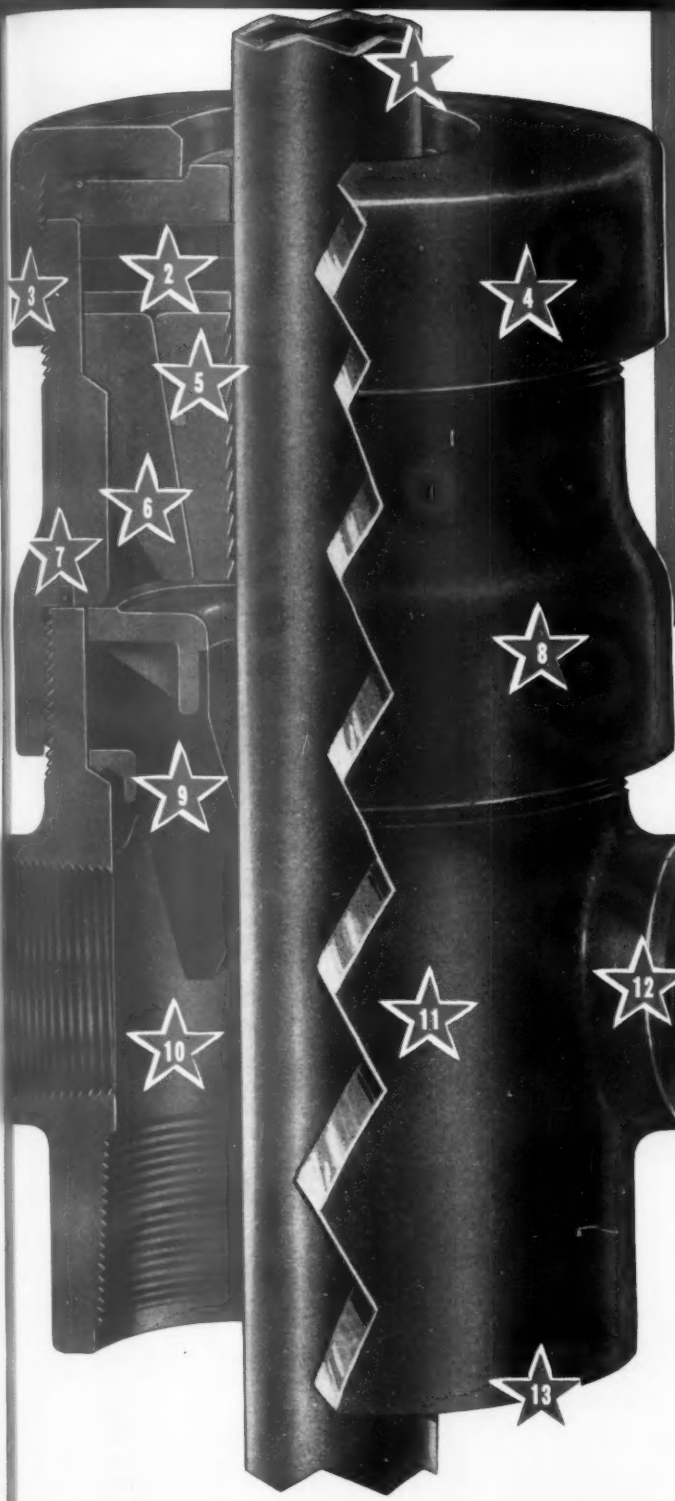
Fig. 2—Cleared right-of-way. Drag line building fill of main road to B 1 M. Lawler

Three companies, Gulf Refining Co., Humble Oil & Refining Co., and The Texas Co. participated in the cost of roads constructed by Gulf. Protection of well locations by means of dikes has been carried out by each company individually.

The first well in this area was drilled during 1937 by Gulf. This well, E1-A Haas-Hirsch, was carried to a depth of 12,298 ft. and completed as a dry hole. The second well drilled in the field, E-1 Haas-Hirsch, was completed by Gulf as a producer in 1942. Subsequently the original well was plugged back and completed as a producer. At the present time the three companies have completed six wells which are producing from an approximate depth of 9,400 ft.

Access to the first Gulf well was by means of a board road, and when the second well was drilled, the original board road, which was approximately 2½ miles in length, was extended 3,700 ft. A maintenance crew was required to work full time to keep the road in condition for drilling operations.

The magnitude of the road and dike project undertaken by Gulf and completed during the latter part of 1944 is brought out in Fig. 1 showing a typical section of the jungle-covered swamp which had to be cleared before the water-control work could be started. In July just as the high water was receding from the area, the roads were surveyed and the right-of-way (the maximum width of which was 200 ft.) blazed. The slashing crew, consisting of 8 to 12 men, followed the surveyors and cut down all vegetation which



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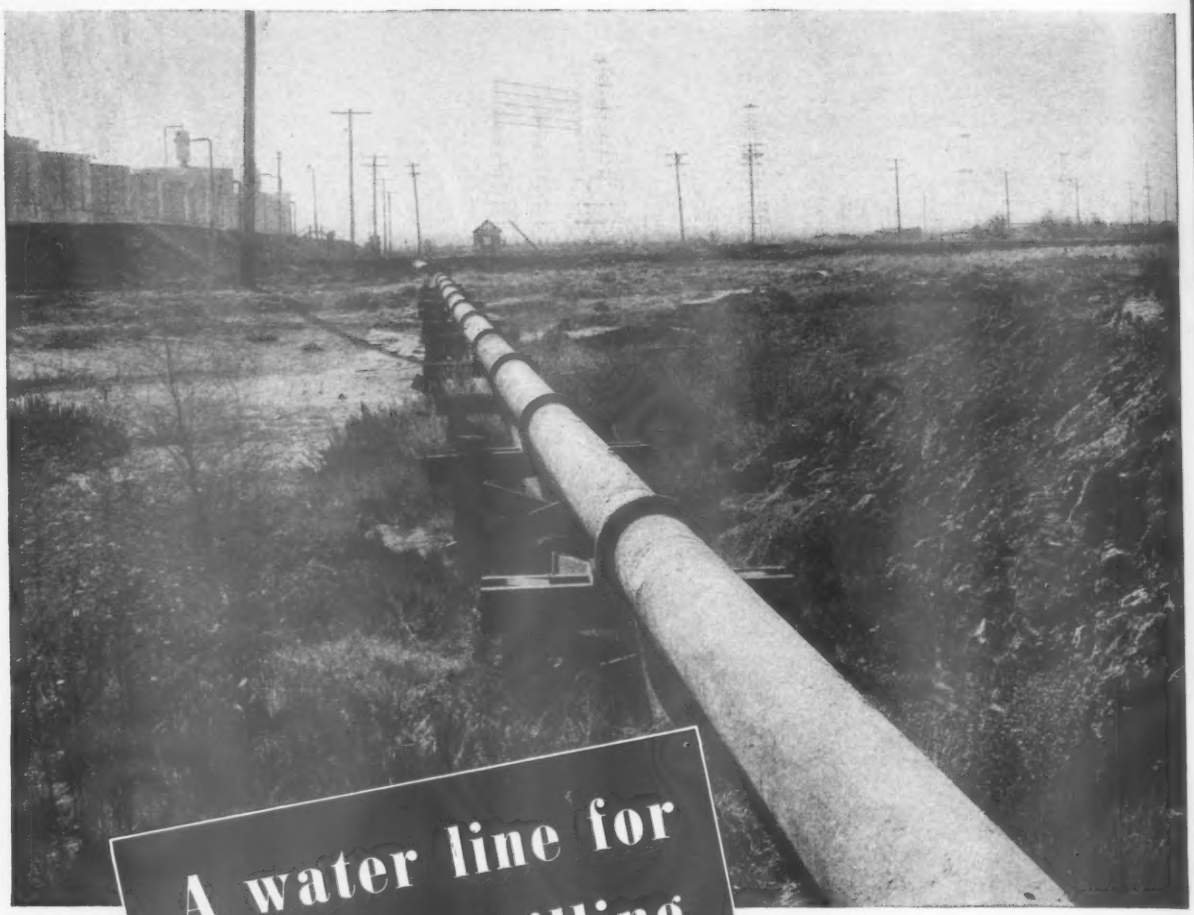

A water line for oil well drilling in California

The petroleum industry is well known for the skill and attainments of its engineering in both production and refining. The cast iron pressure pipe industry therefore takes it as a compliment to its own product that so many uses are found for it in oil-field and refinery. Some of these uses are for water, fire protection and sewerage lines, rundown lines, gasoline lines, foamite lines, salt water disposal, condenser and cooling lines. The cost per term of service is usually the lowest. Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 1015 Peoples Gas Building, Chicago 3.

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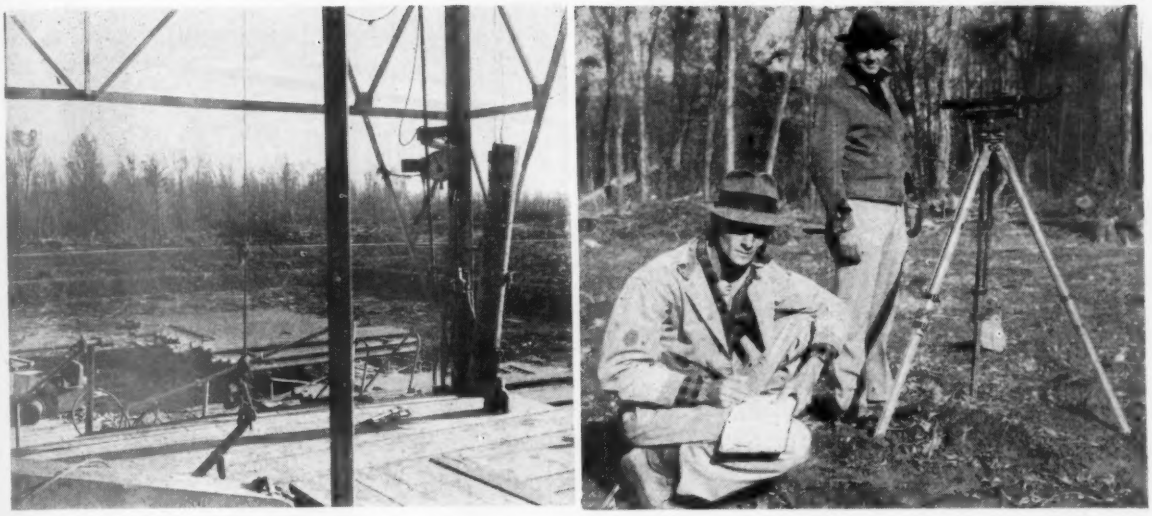

Fig. 3—(Left) Gulf 2 Haas & Hirsch, showing road in background, and type of dikes built to protect wells from flood waters. Right: Samuel L. Fariss, division engineer, in charge of water-control project, and George H. Lacy, chief civil engineer, Gulf Refining Co.

could be cut by hand. This included trees up to approximately 4 in. in diameter. The slashing crew was followed by the bulldozers which swept and pushed aside all trees possible.

All trees which could not be handled by the bulldozers were cut down by several four-man crews of sawers who worked behind the bulldozers. Five drag lines were used in building the fills. Fig. 2 shows a cleared right-of-way and a drag line in operation. The high water during 1944 stood at an elevation of 23.7 ft. above mean Gulf sea level, and the project called for an elevation of 25.7 ft. with a 24-ft. crown.

During the construction of roads and dikes every attempt was made to obtain maximum compaction. In this connection it was found that the top 3 or 4 ft. of the borrow pit gave a high degree of compaction; however, below this depth the soil was extremely gummy.

Road work was begun during the latter part of August and all gravel had been placed on the roads by the end of September. Approximately 17,000 tons of gravel were used on the 6 miles of main roads.

Each well is protected from inundation during high water by a dike (as shown at Gulf 2 Haas & Hirsch in Fig. 3) which is the same height as the road. The well dikes have a 5-ft. crown and form a rectangle 404 ft. in length and 326 ft. in width. The inclosed space provides sufficient room for the slush pits and tank battery and tank-battery site. The main road ramps down to a board road inside the derrick levee.

During the past spring, flood waters in the Krotz Springs field established a new record and practically reached the top of the roads; however, they were usable at all times. During this period the water level behind the Atchfalaya River levee (which is a short distance east of the field) was 10 ft. above the water level in the field. During the flood a small section of the well levee at 1-A and 1-E Haas-Hirsch broke. Following this, in order to equalize pressure and prevent further breakage of well dikes, a cut was made at all locations. When the high waters subsided the dikes were repaired and locations pumped out. It should be mentioned that floodwater pressure on the roads is equalized by means of 36 and 48-in. culverts.

According to Samuel L. Fariss, Gulf engineer in charge of the project, the entire water-control project was completed without a serious accident. He further stated that despite the fact that the area is infested with cotton-mouth moccasins, there were no injuries from this source.

J. S. Crowe, Gulf drilling superintendent, on location at 1 St. Landry

Fig. 4—New roads in Krotz Springs field are well marked

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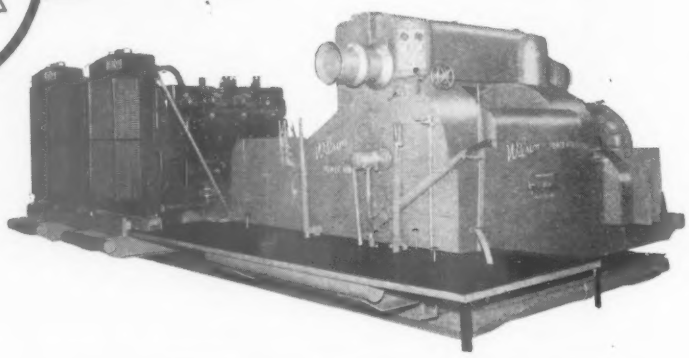

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Paloma Unit—An Advanced Oil, Gas And Products Producing Operation

by Kenneth B. Barnes

PART 2

In this article the processing cycles and related process equipment of California's only combination cycling and pressure-maintenance plant are discussed. In the issue of August 18, the reservoir, drilling, completing, metering phases were presented

5—Processing Cycles And Equipment

PLANT processing, detailed in the accompanying flow chart, is:

Wet gas is separated from condensate at stages of 2,000, 800, 300, and 75 psi. Raw condensate from the last stage is fed to a debutanizer. The debutanized condensate is of 48.5° gravity, has an end point of 715° F.

Gas separated at the 300-psi. stage is compressed to 800 psi. The separated gases at 2,000, 800, and 75 psi. are passed through three absorbers at corresponding pressures. Residue gas from the 2,000 and 800-psi. absorbers is compressed to 4,500 psi. and returned to the formation. The 75-psi. residue is used for fuel.

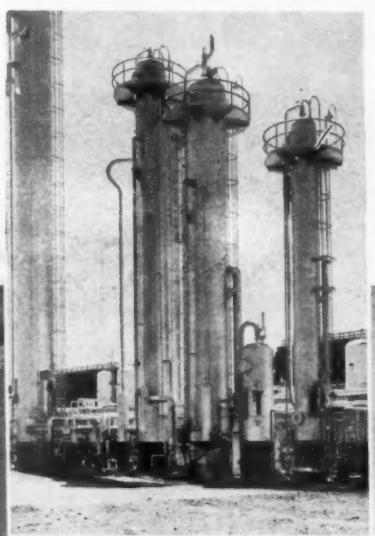
Rich oil from the 75-psi. absorber is sent to a high-pressure stripper for removal of raw gasoline and lighter fractions; heavy materials are removed in a low-pressure stripper and sent to the crude-condensate storage. Cooled lean oil is returned to the three absorbers.

Raw gasoline and lighter fractions from the high-pressure stripper are combined with butanes and lighter fractions from the condensate debutanizer. This stream is sent to a depropanizer for removal of propane and lighter fractions; heavier fractions are charged to a gasoline debutanizer for separation of natural gasoline and butanes.

Present plant production:

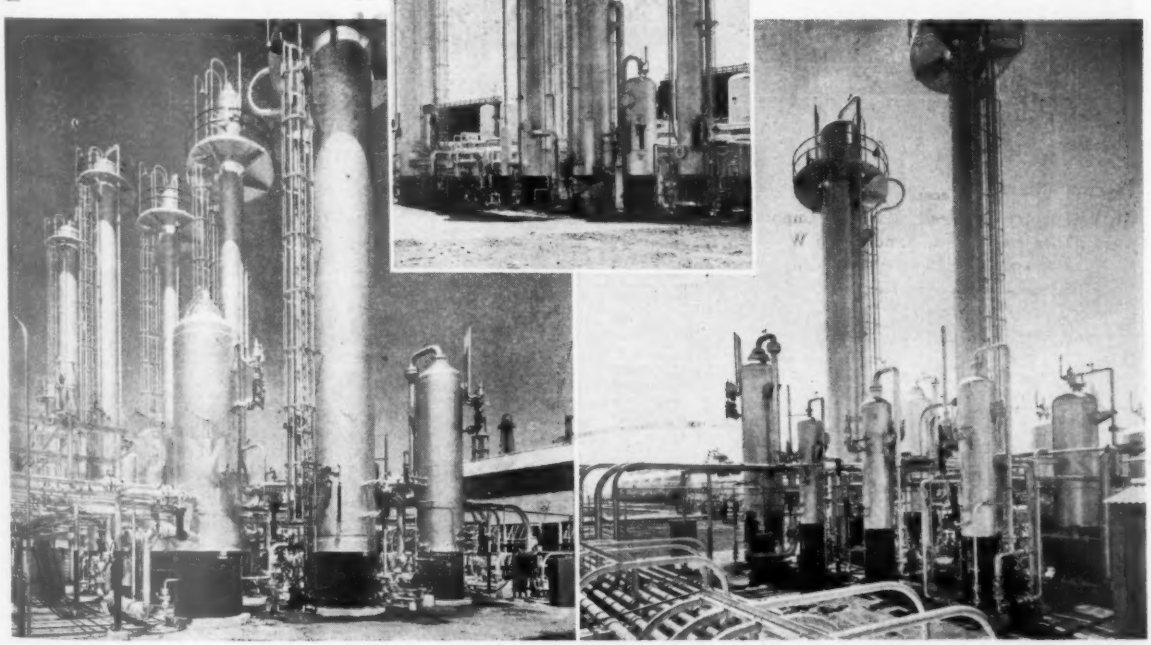
Product—	Bbl. per day
Condensate	5,000
Gasoline	1,080
Butanes	1,000
Propane	500

In foreground, the four tall towers serve the following functions (left to right): Raw condensate debutanizer (200 psi.); low-pressure (10 psi.) absorption-oil stripper; high-pressure (90 psi.) absorption-oil stripper; atmospheric absorption-oil reclaimer

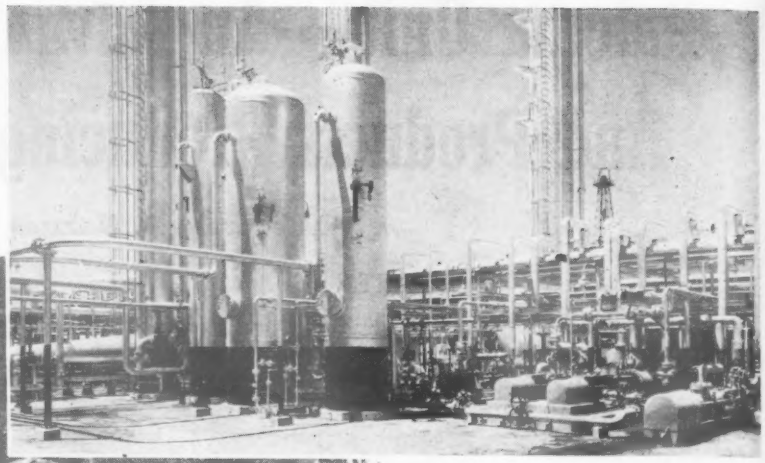


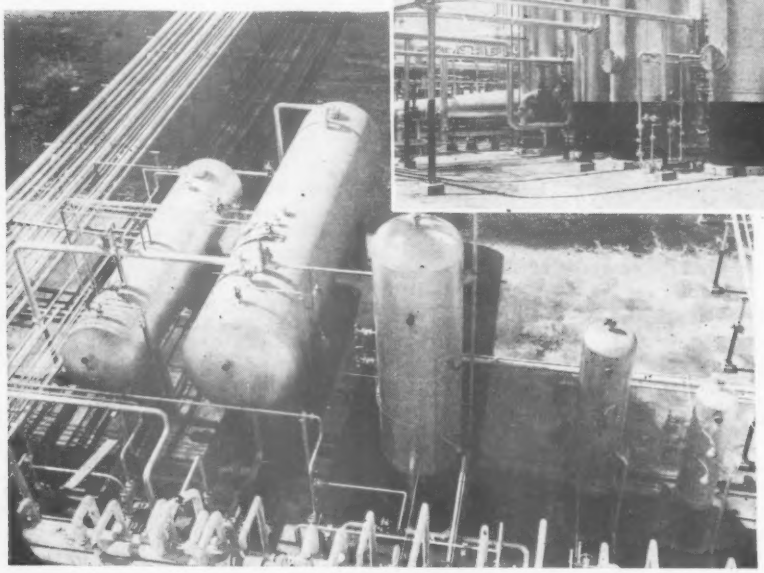
Ten of the processing units are shown here. Left to right, they are: 2,000-psi. compressor-suction scrubber; 75-psi. scrubber; 2,000-psi. absorber; 800-psi. compressor-suction scrubber; 2,000-psi. gas-condensate separator; 800-psi. absorber; 300-psi. compressor-suction scrubber; 300-psi. gas-condensate separator; 300-psi. rich-oil flash drum, and 300-psi. recompressed gas separator

In foreground (left to right) are the 2,000-psi. gas-condensate separator, the 2,000-psi. absorber, and 2,000-psi. gas scrubber. Photographs courtesy C F Braun & Co.

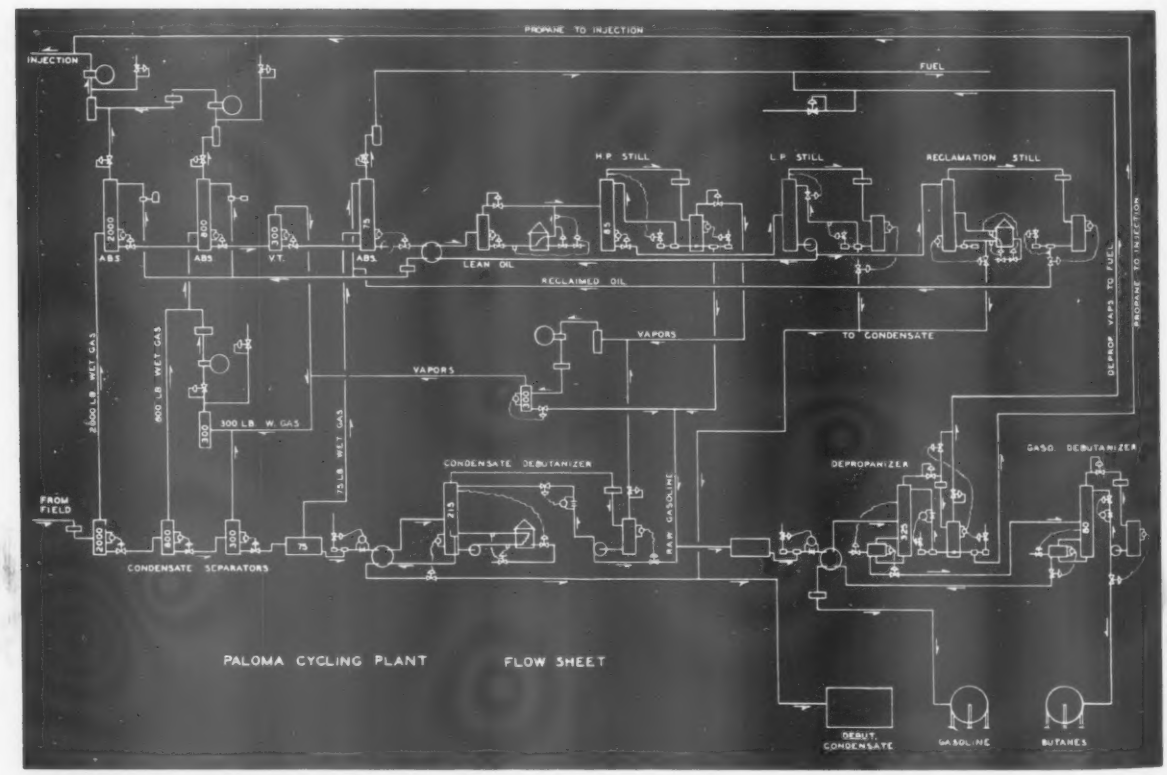


Below: The depropanizer (185 psi.) and condensate debutanizer (75 psi.) feed surge tanks, the high and low-pressure stripper and reclaimer accumulators. In both of these views note use of overhead piping systems carried on steel supports, rounded turns, insulation and wrappings





Above: In central foreground (left to right) are the accumulators for the 75-psi. gasoline debutanizer, 200-psi. condensate debutanizer, 315-psi. depropanizer. The tall columns are the gasoline debutanizer (75 psi.), crude debutanizer (200 psi.) and gasoline depropanizer (315 psi.) To the right the twin plunger pump takes excess liquid propane at 315 psi. and injects it into the 4,500-psi. gas-injection system for return to the producing formation. During this pressure increase each 43 gal. of liquid propane shrinks to 39 gal. The right-hand unit pumps lean oil to 800-psi. absorber



Extensiveness of pressure, temperature and flow-rate control equipment in modern cycling plants is well illustrated in the above drawing. Practically every individual process unit shown operates through a motor-diaphragm valve under one or more such controls

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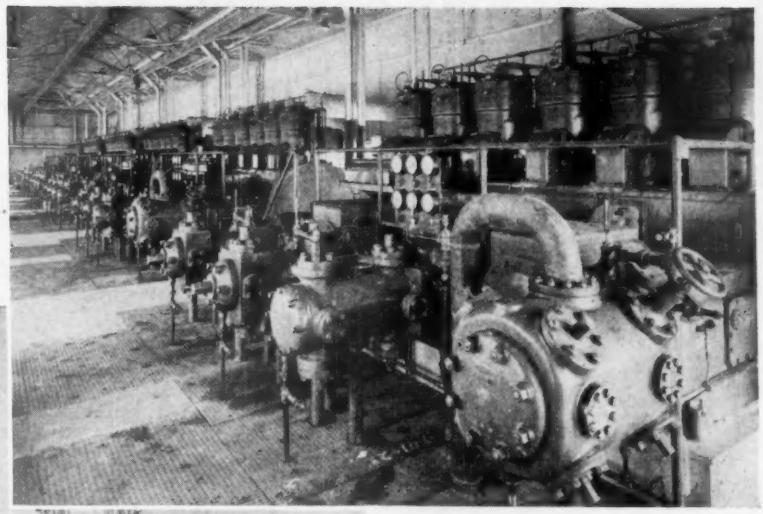
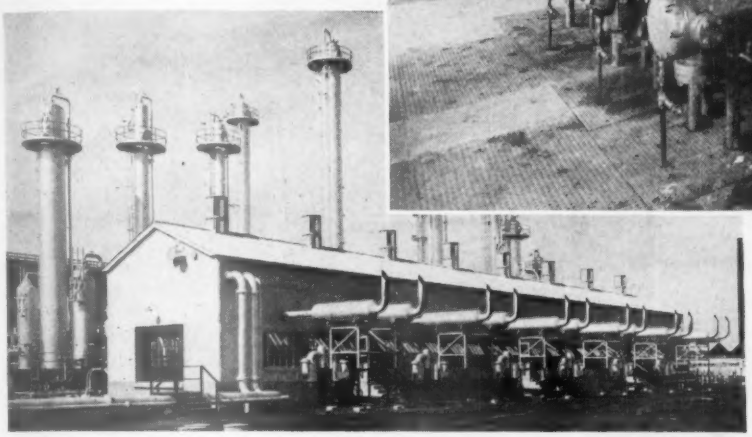
6—Compressor Plant And Auxiliaries

ONE of the highest end-pressure plants, the four compression stages at Paloma are split among the group of six 600-hp. angle machines so that if one is stopped the services are reduced proportionately. Five units have two fourth-stage cylinders each and the sixth has three. Each of the six has one 800 to 2,000-psi. cylinder. There is one 300 to 800-psi. cylinder on two units and one 75 to 300-psi. cylinder on two machines. One unit has a common spare for use between the two low-pressure services. All discharges are fitted with pop valves and frangible safety disks. The photographs show the interior and exterior of the compressor plant.



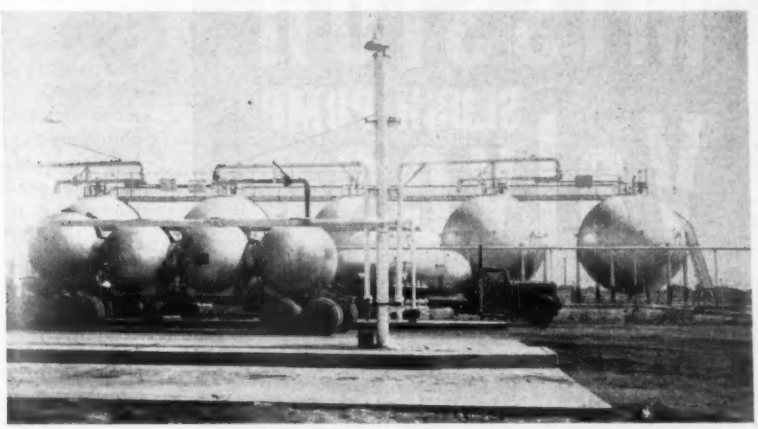


Automatic controls and regulating devices are profusely employed in the plant. A signal light panel indicates performance of various units and equipment, supplemented by an audible alarm system. A master pressure reduction regulator maintains uniform pressure on the gas feed to the plant, will close if the plant pressure falls below a pre-set minimum.

7—Crude and Products Storage

Right: Tank trucks at the loading rack filling with LPG products. One has a horizontal cylindrical vessel, the other, four in-line spherical containers for propane

Below: There are five 2,500-bbl. spherical tanks. Butane is held in three at 100 psi. and natural gasoline in two at 50 psi. Recently installed, nearby, is a long horizontal, cylindrical 25,000-gal. tank of 250-psi. working pressure for storing propane. There are three 10,000-bbl. cone-deck tanks for storage of debutanized condensate and four 5,000-bbl. tanks for the black oil



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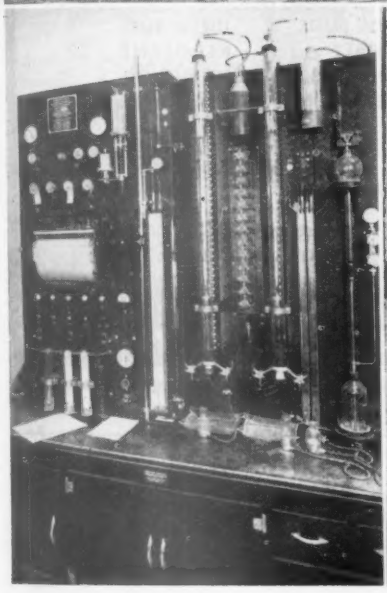
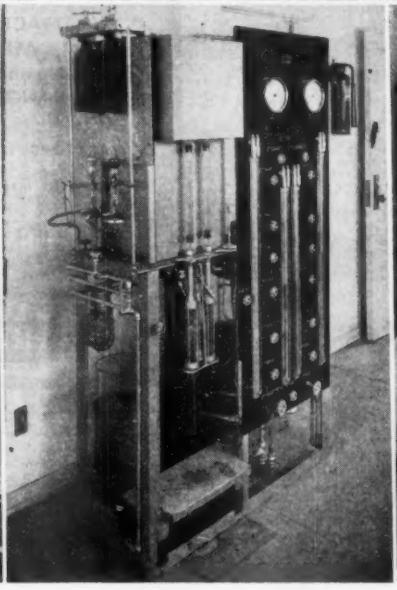
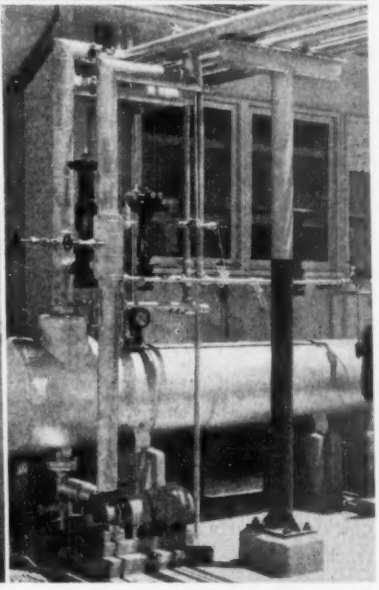
8—Plant Offices, Laboratories, Testing Equipment







PLANT offices and laboratories are of neat appearance and conveniently arranged. Air conditioning is provided by compact outdoor unit which utilizes vaporization of excess propane. This cools water which is pumped to the buildings for cooling the air. The expanded gas is used for fuel. Included in complete testing facilities are automatic recording low-temperature-fractional and rectified-charcoal distillation units.

Other California Gas-Injection and Recovery Projects:

IN addition to Paloma, there are a number of other gas injection projects in California. These range from those for purely gas storage, through gas-drive methods, to several pressure-maintenance operations in relatively new oil pools. Most are run in connection with natural-gasoline plants, and the production largely is by natural flow. In a number, the reservoir pressure is of the order of 3,000 psi. or higher. California utilizes in various ways practically all of her oil-field gas, and flares or open vents of any substantial proportions are nonexistent.

Pool and county—	Total pool oil prod. (bbl./day)	Depth	Principal operator	Remarks
North Coles Levee, Kern	15,275	8,000-10,000	Richfield Oil Corp.	Pressure maintenance
South Coles Levee, Kern	2,725	8,300-10,000	Ohio Oil Co. et al	P. M. (construction)
Canal, Kern	3,575	8,250	Shell & Ohio Oil	Pressure maintenance
San Miguelito, Ventura	5,375	7,500	Continental Oil Co.	Pressure maintenance
Newhall-Potrero, Los Angeles	5,175	7,700	Barnsdall Oil Co.	P. M. (construction)
Rio Bravo, Kern	17,475	11,250	Superior Oil et al	P. M. (consideration)
North Kettleman, Fresno-Kings	41,175	7,000-10,000	Kenda & Standard	Gas injection
Elk Hills, Kern	65,000	2,600- 3,500	U.S. Navy-Standard	Gas injection
Dominguez, Los Angeles	18,500	4,000- 8,000	Union Oil & Shell	Gas injection
Richfield, Orange	7,275	4,000	Several	Gas injection
Santa Maria Valley, Santa Barbara	40,500	4,000- 6,000	Union Oil Co.	Gas injection
West Coyote, L. A.-Orange	15,075	4,000- 6,000	Standard Oil Co.	Gas injection
Goleta, Santa Barbara	.....	4,150	Pacific Lighting	Dry gas storage
Playa del Rey, Los Angeles	2,500	3,350	So. Calif. Gas-DPC	Dry gas storage
North Belridge, Kern	6,350	5,000- 9,000	Belridge Oil et al	Gas injection
Buena Vista, Kern	48,850	3,200- 4,500	Standard et al	Gas injection
Greeley, Kern	16,900	11,250	Standard et al	G. I. (consideration)

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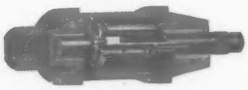

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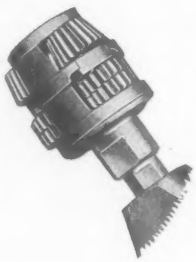

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Role of Stratigraphy In Oil Discovery

by Vincent C. Illing*

This is an extended digest of an address delivered at the business meeting of the American Association of Petroleum Geologists at Tulsa, in March. The full paper will be presented in the July A.A.P.G. Bulletin. The discussion stresses the fact that there is a tendency to underemphasize the role of stratigraphy and to overemphasize the role of structure in the search for oil and gas. It outlines many phases of the problems in which stratigraphic studies should be used.

IT is a refreshing and profitable undertaking to review from time to time the basic principles on which we work. Geologists have broadened and elaborated their theories of oil and gas accumulation as a direct method of finding oil, and both geology and geophysics are primarily concerned in the discovery of structural traps as the most direct approach to this problem.

It has long been realized that the structural theories are only a part of the story of oil accumulation. I wish to emphasize that before structural theories can legitimately be applied, there are other stratigraphic requirements which must be fulfilled if the sediments are to be oil bearing.

These considerations are not made in every survey because most examinations are localized in areas where the stratigraphic features are known to be favorable. All petroleum provinces represent such areas, but their limits are more often than not decided by stratigraphy rather than structure. The daily task of the exploration geologist may be concerned so much with structural issues that he can easily get a distorted view of their importance. Yet, every structural feature is part of a stratigraphic story and is permeated with stratigraphic problems.

An oil pool is an incident in the life history of a cycle of sedimentation. In the early stages of exploration of any new area, the stratigraphic features are of extreme importance, for in the main they are decisive as to the general importance of the area and the distribution of the main body of the pools.

Usually there ensues a period of structural hunting, with geologists and geophysicists using theories of structural accumulation as a short cut to find those pools that are influenced partly or mainly by geological structure. However, these pools do not exhaust the region and eventually the geologist must return to his stratigraphic studies, or the wildcatter must pinpoint the area with a sufficient density of wells, if all stratigraphic pools are to be discovered.

I believe that this overemphasis on structure in the middle period of discovery is harmful. It blurs the importance of stratigraphy and leads to the neglect of vital information. It tends to oversimplify the evidence in structural pools and often leads to the abandonment of areas which still have considerable possibilities.

It is not scientific to concentrate attention on one factor alone when looking for oil and gas, and it is with a view of introducing some measure of a corrective tendency that I venture to stress the importance of the stratigraphic features in a full exploration campaign. An oil pool is an integral part of the stratigraphic history of the sedimentary basin in which it is formed, and its characteristics are determined by factors within the sediments.

Many areas which failed to yield oil can be shown to be disappointing not for lack of structure, but because of stratigraphy. Used as a positive means of directing attention to the most likely territory, or as a negative warning of the unfavorable conditions in a particular area, stra-

*Professor of geology, Imperial College of Mines and Technology, London, England.

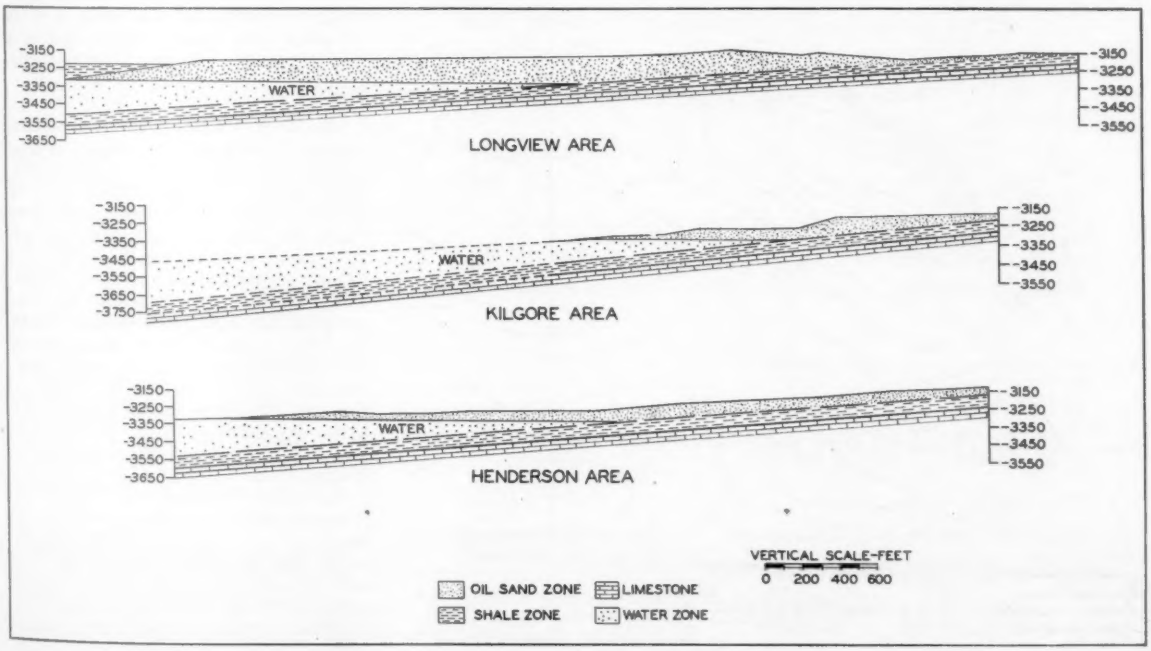

Fig. 1—Stratigraphic cross sections in East Texas field

tigraphy is the foundation of the geologist's evaluation of any general region.

The geologist may use other tools for discovery, but as soon as his problem becomes complex, he must inevitably return to stratigraphic considerations. Where all the stratigraphic features are favorable, the geophysicist can sometimes afford to neglect geological advice. When the stratigraphic features are complex, he would go completely astray in forming an opinion without geological evidence.

Stratigraphy and Source Rocks

The formative phases of an oil pool can be divided into two stages. The deposition of the source sediments and the formation of oil and gas determine the general boundaries of the petroleum province. The second stage is the formation and growth of individual pools. It is part of the history of the sediments after they are laid down and is associated with the fluid movements of water, oil, and gas as the strata become compressed.

In dealing with the inception of the petroleum provinces, it is now generally admitted that oil and gas are usually formed within sediments of a marine type from organic matter distributed through the strata. How, when, and why oil and gas are formed are subjects on which there is a great diversity of opinion, but the answers are necessary if we are to pursue the task of oil discovery with a clear conception of all the problems involved.

The source rocks obtain their organic matter from the sea or from neighboring land masses. The types of environment in which this organic matter can be deposited within the sediments becomes the first goal of the stratigrapher who is attempting to determine the boundaries of an area in which oil and gas may be anticipated.

Whereas oil can be formed in many different ways, the problem in any particular case is limited by the consideration that it must be one to which the source rocks have been subjected. Their history forms the first test to which every theory of origin of oil must conform. For this reason the origin of oil is essentially a geological problem and can only be finally solved on the evidence which stratigraphy produces. The help of the chemist, biochemist, and biologist is essential, but the pool of evidence produced by all methods of attack must be sifted and selected to conform with the controlling stratigraphic evidence.

Too little attention has been paid to the identification and study of the source rocks in each petroleum province. In many areas we are still uncertain of the identity of the mother rock, and because these studies have been neglected, our knowledge of the limits of the petroleum provinces lacks the precision which this evidence would have supplied. If we could establish our source rocks, knew more about their supply of organic matter, the environment in which they were deposited, and the critical conditions which cause the oil to be formed, we should be a long way on the road to a complete study of our petroleum provinces.

In concentrating too exclusively on the structural theories of accumulation, geologists have strayed into a single, easy avenue of approach, rather than viewing the problem as a whole. At some period the question is bound to arise whether each area has been exhausted. The answer can be obtained either by exhaustive and expensive drilling, or by the evidence which stratigraphy can give.

Among this evidence, the extent and richness of the available source rocks is bound to be of primary importance. Therefore while drilling up the oil and gas areas, it is important that attention should not be focused too exclusively on potential reservoir rocks, for existing in the associated strata is a rich field of evidence whose value should not be underrated.

In abandoning the tedious and protracted petrological examination of samples and the biological evidence they contain for the simpler, more complete, but stereotyped physical record which the electrical-log survey provides, we are gaining in the ease of correlation, but are losing substantially in other lines of evidence which we cannot afford to discard. The only safe approach is to study all factors which have a bearing on the subject, and the problem of source rocks is of fundamental importance.

On the boundaries of every sedimentary basin a limit arises where the source rocks must cease to function. Usually the potential area of source rocks is considerably less than the area of the basin, though it is usually much greater than the extent of individual reservoir rocks. The stratigraphic reasons for the absence of effective source rocks may be varied. They may never have been deposited or their richness in organic matter too low, or the environment of deposits may have so changed that their original organic content has completely disappeared.

All these possibilities have a stratigraphic significance. It is therefore of fundamental importance that we must learn: (1) The environments in which source rocks are laid down; (2) whether there is an effective lower limit in organic content, below which a source rock will not yield up oil to the reser-

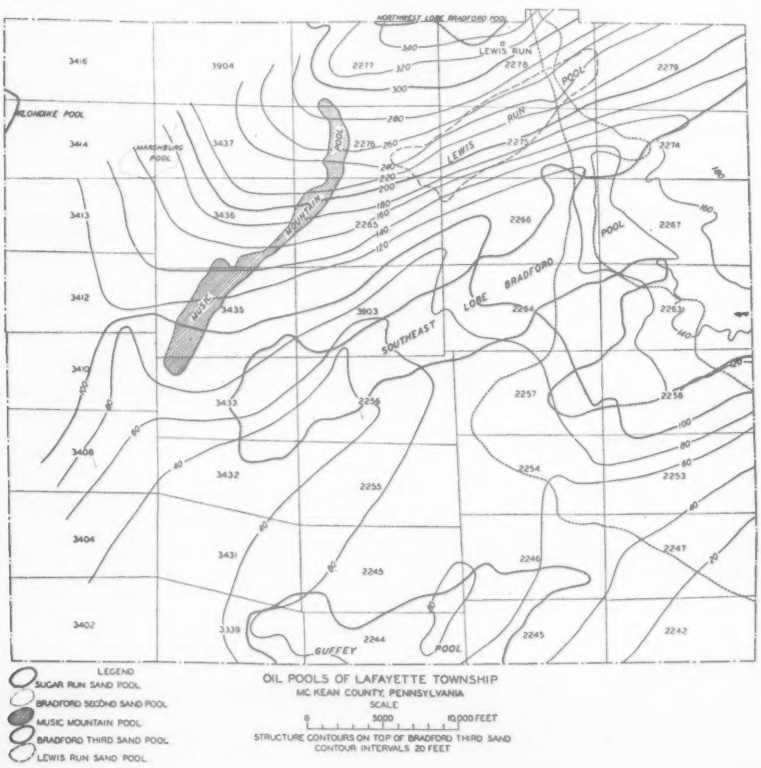

Fig. 2—Stratigraphic traps in Pennsylvania

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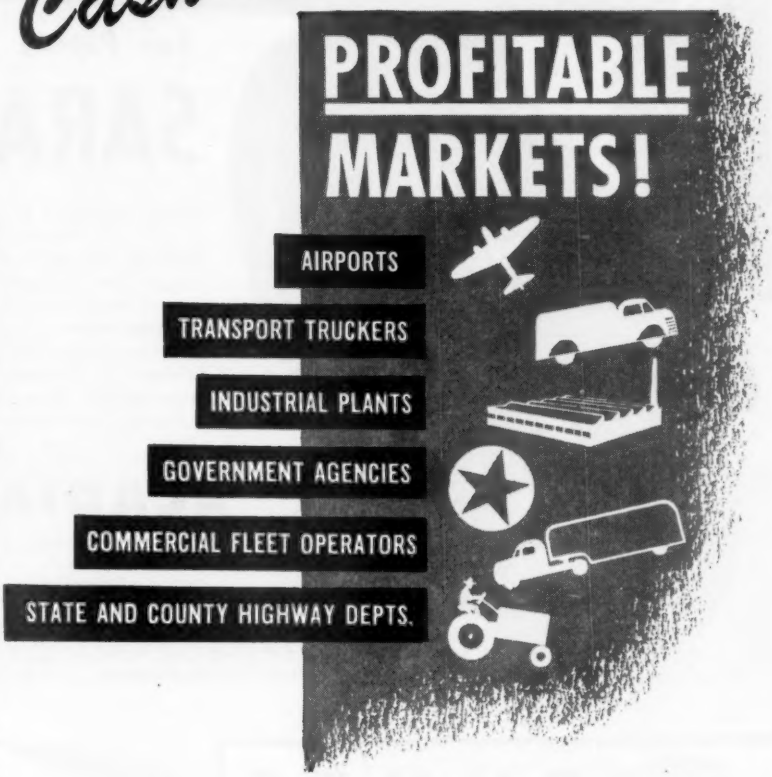

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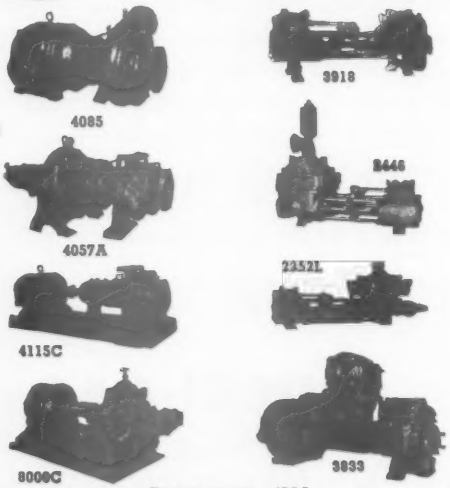

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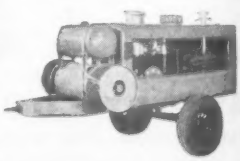

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voir; (3) whether this lower limit depends on the nature of the source rocks and the degree of compaction; (4) when and how are the oil and gas formed in the source rocks, and (5) why and when does the oil leave the source rock for the reservoir rock, and can this process of migration be repeated at successive stages in the history of sedimentation.

Whether there is a lower limit of richness in organic content, below which a source rock becomes ineffective is one of the fundamental issues. In the early days geologists were prone to regard source rocks as freak deposits of rich organic content. Now the tendency is to go to the other extreme and assume that almost all marine areas will provide such types of strata. The earlier view was too exclusive, but I believe that the general geological evidence and the physical behavior of clays and marls under compression supports the view that source rocks must reach a certain limit of oil content before they will readily yield oil to the reservoir.

The problem of the time interval, during or after sedimentation, necessary for conversion of the organic material to oil, is bound up with the modus operandi of the operation. Is oil formed during sedimentation or is the organic changes due to later influences? This problem is fundamental to the whole question of oil migration and its solution would throw a flood of light on many of our problems of structural accumulation.

There must exist a large amount of stratigraphic information on the time when the first recognizable movement of oil in the strata can be noted and it is curious that this has not received more attention. In Trinidad the evidence of mud flows due to oil and gas was contemporaneous with the upper zones of the oil-bearing strata. If the oil was indigenous to these Miocene formations they must have been formed from organic matter during the Miocene cycle of deposition.

In the same area in the southern oil-bearing portion of the island, the stratigraphic change from marine to deltaic and fresh-water conditions determines the normal upper limit of the oil-bearing strata. As the latter are traced northward across the island, facies changes are intense. These facies changes appear to play a part in determining the presence of oil, although more evidence will be needed before the picture becomes clear.

It is such stratigraphic studies that are required if the geologist is to be fully equipped for the search for oil. I do not deny the immense value of structural theories as an effective and rapid approach. I do contend that of we weaken our study of the fundamental stratigraphic problems by too exclusive a use of structural attack we are likely to lose thereby, particularly in the later phases of exploration.

Stratigraphy and Reservoir Rocks

The importance of stratigraphic factors in determining the position of these fields classed as "stratigraphic traps" need not be stressed. Fields like East Texas (see Fig. 1) point the moral even to those who will take only a superficial view. Those who are prepared to look below the surface realize that stratigraphic factors have played a vital part in all oil fields, even in those which to the superficial observer seem ascribable entirely to structure. When the behavior of oil fields all over the world is examined in detail, it will be seen that the petrographic characteristics of the reservoir are so important that often they dominate all other features, even including structure.

These petrographic characteristics cannot be forecast at the surface, and until drilling records are available, these features cannot be used as a direct means of searching for oil. The result is that fields discovered on the basis of structural hypotheses, tend to have their stratigraphic peculiarities overlooked, even after the latter become clear through development. An isolated lens field discovered on an anticline would be ascribed to the anticlinal hypotheses, and only when such a lens was discovered by chance in the heart of a syncline would it receive its true classification as a stratigraphic trap.

Most structural theories depend, for their validity, on the ability of oil and gas to migrate with considerable freedom. Therefore it is generally true that for any particular structure to function as an oil trap, the reservoir rock (that portion of the sedimentary column with sufficient permeability to allow free lateral segregation of gas, oil, and water) must extend over and beyond the limits of the structure.

In Pennsylvania the general structure is a large regional syncline. We do not regard the individual pools as examples of oil accumulation in a syncline, because the actual reservoirs are only small segments of the sand sheets (see Fig. 2), and even the latter do not extend to the whole limbs of the regional syncline. However, where we are dealing with large folds and reservoir rocks whose lateral extent is limited by sedimentation conditions, and where the reservoir rocks are small relative to the wave lengths of the folds, there is no apparent reason why a lens within a syncline should not be as rich in oil and gas as one within an anticline.

In Trinidad, the producing areas in the southwest of the islands are limited to those regions where the the Forest, Cruse, and deeper formations contain sands. As these sands are traced in a northeasterly direction, they diminish rapidly, and the structures which in the west carry oil become valueless towards the east, because of the lack of development of sand reservoirs. There is no doubt of the importance of the anticlinal theory in Trinidad, and it functions wherever there are sand reservoirs of suitable extent, but it will not function without the sands. Such cases are well known all over the world, and are so self-evident that the geologist often fails to stress their significance.

Stratigraphy being the record of past conditions in the strata, the significance of reservoir rocks is usually as a record of littoral deposition, beach conditions, etc., or of moving bodies of water, such as marine currents which can carry sands considerable distances over the continental shelf and deposit them in ribbons and lenses over the ocean floor. The position of the strand lines and of the ocean currents must vary considerably as diastrophism alters the distribution of land and sea in time.

Once an area has been studied, and a knowledge of its sediments accumulated, it is possible to trace the general distribution of reservoir rocks in time and space. Then no matter how much the geologist may use local structure as a guide to drilling, he must also use his stratigraphic knowledge as a general framework for his policy of exploration. Certain areas will be drilled to specific horizons, because suitable reservoirs can be expected within them. Local structure may guide the final location of the exploratory well, but all the structures in existence become valueless unless there are reservoir rocks below the surface.

One of the many concerns of stratigraphy is the study of the past distribution of land and sea, and the changes in the conditions within the sedimentary basins, as diastrophic movements produce transgressions and regressions in the same general area. Such movements of the strand lines are one of the most important studies in determining the zones where overlapped sand beaches and sand bars are likely to be included in the succession. The belts over which these movements take place, and the zones adjacent to buried ridges on the sea floor, are normally the most favorable zones for reservoir rock formation. The guidance of geology is required in determining where these zones are most likely to occur at various stages in the geological column.

XUM

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Flashing Cracking Plant Residuum

We have a 14° A.P.I. cracked residuum at 820° F. that we would like to flash down to a gravity of 8 A.P.I. How low a pressure will be necessary and what increase in cracked gasoline yield can be expected?—C.A.N.

It is not the policy of this department to answer specific design or cost problems. These are the province of the Smaller War Plants Corp., private consultants, or your own engineering design staff, but some general information can be given.

In a most general way the increase in gasoline yield for each degree of reduction in the gravity of the cracked residuum is about 1½ per cent. Thus, in reducing the gravity from 14° to 8° A.P.I., the increase in gasoline yield will be about 9 per cent. This increase in yield comes from the cracked residuum but additional residuum is also converted into cracked gas in the amount of about 2½ per cent. These percentages are based on the charge stock.

The curves in Fig. 1 indicate the behavior of one such stock. Obviously, each different stock will have a different distillation curve and different flash vaporization characteristics. According to these curves it will be necessary to vaporize something in excess of 66 per cent of the 14° A.P.I. residuum in order to make a final 8° A.P.I. residuum; perhaps it will be necessary to vaporize as much as 80 per cent. The 6-6½ A.P.I. residuum so produced is cut back with cracked distillate to produce a final 8° A.P.I. residuum which has a viscosity not in excess of 300 seconds Furol at 122° F. A vacuum will be required to reduce the gravity to 8° A.P.I.

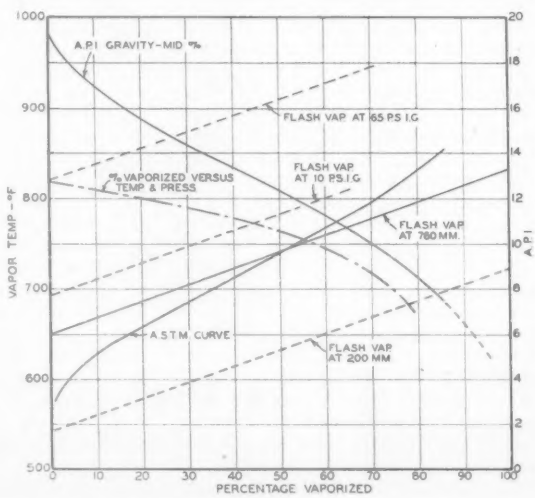

Fig. 1 — Adiabatic vaporization curve of 14° A.P.I. cracked residuum, and the construction curves used in preparing the per cent-temperature-pressure curve

The curves were constructed as follows:

1. Construct distillation and flash vaporization curves for atmospheric pressure.

2. Assume some percentage vaporized, e.g., 45 per cent.

3. By a heat balance compute the decrease in temperature from 820° F. that will occur by the vaporization of 45 per cent. This temperature is 774° F.

4. A temperature of 731° F. at atmospheric pressure is required to vaporize 45 per cent.

5. The pressure required to raise 731° F. to 774° F. is about 10 psig.

6. Other points on the vaporization curve for 57 and 78 per cent vaporized are computed in a similar manner.

Pressure Drop With Vapor Liquid Mixtures

Can you tell me of references to the pumping of mixtures of crude oils and natural gas in the same line? This would be good for transporting fuel gas to our refinery. How can I compute the pressure that is required?—L. S. B.

Little seems to have been published on such a situation. We can only direct you to a few general references, none of which pertain directly to your problem:

1. Dittus & Hildebrand—A Method of Determining the Pressure Drop for Oil-Vapor Mixtures Flowing Through Furnace Coils, Trans. of the A.S.M.E., April 1942.

2. Uren, Gregory, Hancock & Feskov—Flow Resistance of Gas-Oil Mixtures Through Vertical Pipes, Tech. Publ. No. 252, A.I.M.E., 1929.

3. Boelter & Kepner — Pressure Drop Accompanying Two-Component Flow Through Pipes, I. E. Ch. 31, 426, 1939.

4. McAdams, Woods & Heroman, Jr.—Vaporization Inside Horizontal Tubes, II Benzene Oil Mixtures, Trans. of the A.S.M.E., p. 193, April 1942.

5. Nelson, W. L.—Pressure Drop in Box Condensers, The Oil and Gas Journal, p. 93, May 18, 1944.

6. Nelson, W. L.—Petroleum Refinery Engineering, 1st Ed., p. 268, McGraw-Hill Book Co.

7. Nelson, W. L.—Pressure Drop in Pipe Stills, The Oil and Gas Journal, p. 90, March 30, 1944.

Comprehensive Study

The first of these references is perhaps the most comprehensive theoretical study of vapor-liquid pressure drops but the suggested method is extremely complicated; the second pertains to gas-lift situations which involve enormous volumes of gas compared with the oil; the third reference is somewhat the same because it discusses the flow of air-liquid fuel mixtures that consist mainly of air; and the last three references (5, 6 and 7) pertain to conditions of heating or cooling.

Private communications indicate that the friction loss for vapor-liquid mixtures, no matter how complicated the situation may be, can be computed by considering the line as a series of short lengths. The pressure drop through each of these short lengths is computed by a trial-and-error type of solution (if necessary), working back through the line from the discharge end.

If you are considering the handling of a highly volatile (gas charged) crude oil which is totally liquefied at the inlet end of the line, the computations might be handled as follows:

1. Temperature differences may be neglected, at least on first trial computations.

2. Compute the amount of vaporization at the end of the line for the pressure and temperatures there existent.

3. Assume a pressure for some unknown point near the end of the line and compute the length of line required to cause this pressure drop.

4. Item 3 is repeated for sections of the line that are at higher and higher pressures until the point where vaporization starts is located.

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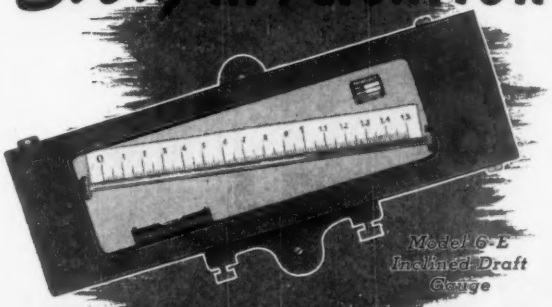

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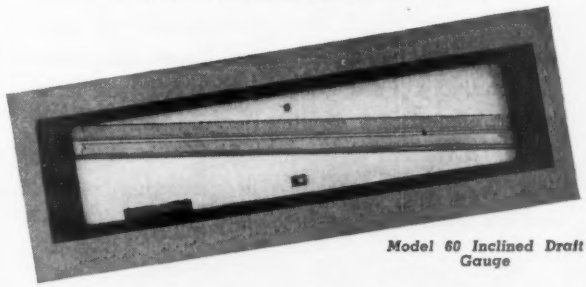

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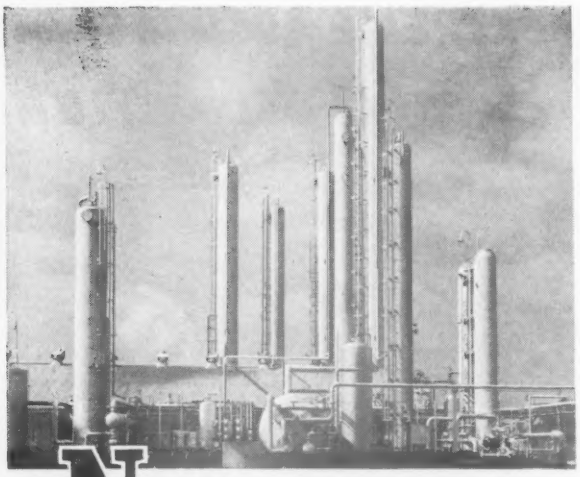

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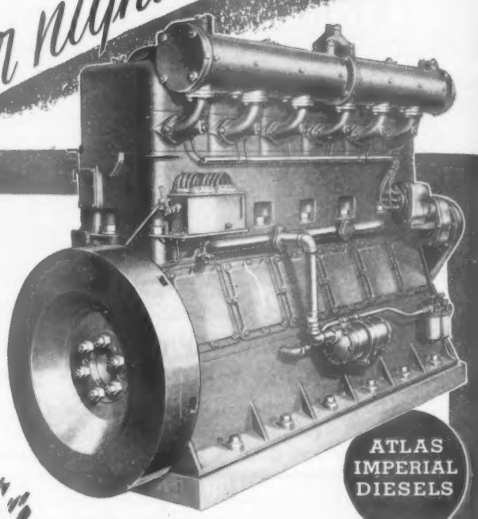

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Refining Technology Goes Catalytic

by Arch L. Foster

PART 1

This series of four articles presents most if not all the different materials used or recommended as catalysts in refining processes. By no means are all the literature references included here, which may be found on the subject; the references mentioned show practically all catalysts which have been considered for refining processes, and their composition. The first article discusses cracking catalysts; succeeding articles will discuss catalysts for alkylation, polymerization, hydrogenation and dehydrogenation, cyclization (aromatization) and miscellaneous reactions.

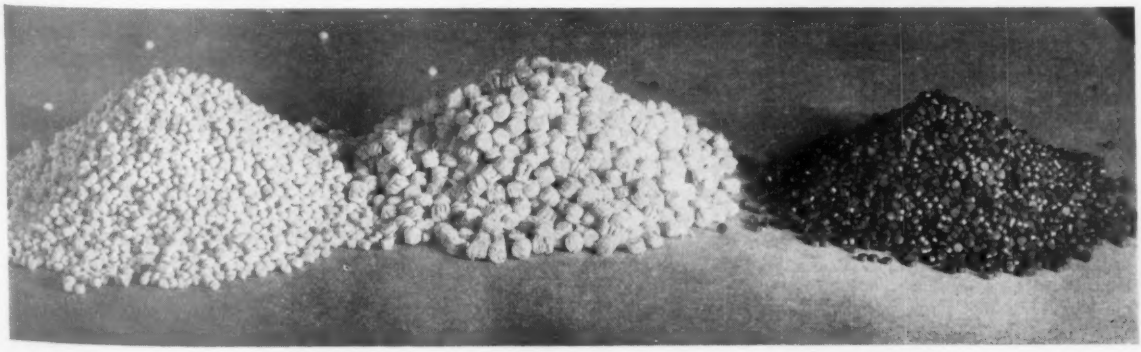
Houdry catalytic cracking unit of Standard Oil Co. (Ohio), at Cleveland. The first of the two 75-ft. fractionating columns on the left serves the three catalytic treating cases seen in the center and the second serves the six cracking cases beyond them, in the distance. Each of the cracking and treating cases contains 1,250 pipes and tubes, representing 15 miles in length, through which gas oil and vapors circulate at temperatures of approximately 870° F. The vapors pass over some 20 tons of catalyst, in the form of tiny chalk-like pellets, in each case. The temperature of the catalyst is kept down by means of molten salt, which circulates in tubes through these cases

CATALYSIS is fast gaining a monopoly of the means for producing reactions required in the manufacture of finished products from petroleum and natural gas. Used for generations in the chemical, essential oil, and other industries, it is only recently that catalytically induced reactions have been employed widely on commercial scale in petroleum refining. Now practically every important refining step is promoted by the introduction of catalysts. In fact, refining may be said rather truthfully to be a catalytic industry.

In a few instances catalysts were introduced to refining 30 or more years ago. The classic researches of McAfee in applying the Friedel and Crafts type of catalyst to the decomposition and desulfurizing of heavy distillates, beginning about 1912-13, is the first process of major possibilities wherein a catalyst was employed to produce new molecules differing radically in weight and in structure from the original molecular form and size. More recent developments indicate that a greater proportion of isoparaffinic hydrocarbons can be produced by cracking with anhydrous aluminum chloride, the Friedel and Crafts catalyst, utilizing more recently developed procedures than was the case in the 1920's when the McAfee process was in commercial operation. Another problem in utilizing this catalyst is that of recovering it economically from the highly complex, unscramblable mass into which it becomes incorporated with hydrocarbon residues in this process. As is shown later herein the use of anhydrous $AlCl_3$ for other reaction promotions under milder conditions has been developed commercially during the war period. It is these processes at present to which this catalyst owes its prominence.

Other prominent catalytic processes which have been operated some time and whose catalysts are among the earlier ones employed by the refining industry are the Houdry cracking process and catalysts, sulfuric acid as an alkylating agent, phosphoric acid as a polymerizing catalyst, and bauxite as a desulfurizing catalyst. The Houdry catalysts were developed during the middle and late 1930's, as was the alkyla-

Three types of catalyst



tion function of sulfuric acid. In fact, with few exceptions, refining catalysts and catalysis reached fruition during that decade.

These articles are not planned to cover blanketwise the literature and development of processes employing catalysts, now used by the refining industry. Several thousand patents have already been issued, many of them are considered improvement patents, and large numbers of applications are all but clogging our patenting machinery. This presentation is planned to assemble the facts of importance regarding the basic materials used as catalysts for the different types of processes, the different types of promoters for catalysts, and the effect on catalyst activity of the addition of different materials, physical and chemical condition of the catalyst, manufacturing methods which affect catalytic activity and efficiency, and results obtainable in general from the use of various catalyst types. Processing and process operations are incidental to the main subject which is the catalysts themselves.

The catalyst has been defined many times by different authorities, yet leaving each time something to be desired as to the over-all complete coverage of the subject. The classical definition that "a catalyst is a substance which promotes or causes a reaction to occur, or speeds up a reaction which is otherwise of extremely slow velocity, or which makes possible a reaction under milder conditions than is possible without the catalyst, at the same time the catalyst takes no apparent or permanent part in the reaction and is recovered in essentially its original state," is probably most nearly correct, yet exceptions, or apparent exceptions, exist. The Friedel and Crafts catalyst, a metal halide like $AlCl_3$, is not recovered in its original state, forming a hydrocarbon complex with the material treated. Some catalysts appear rather obviously to enter into temporary combination with the material to be catalyzed, only to be released in essentially original form. Other catalysts appear to enter no combination at all or if they do, it is for extremely short time periods, too evanescent in nature to be detected. Interesting discussion of this concept is found in Ipatieff's "Catalytic Reactions at High Pressures and Temperatures" (MacMillan).

Arbitrarily and for convenience catalysts are divided here into seven groups, as follows:

1. Catalytic cracking (and reforming).
2. Catalytic alkylation.
3. Catalytic polymerization.
4. Catalytic isomerization.
5. Catalytic hydrogenation - dehydrogenation.
6. Catalytic aromatization-cyclization.
7. Miscellaneous catalysts.

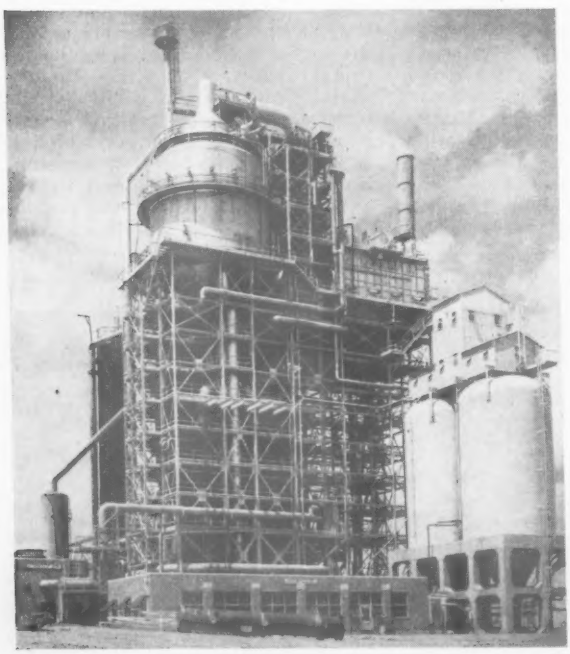
Overlapping of catalysts, or their use in more than one field will be found in a few instances, especially for metallic oxides and their combinations in more than one of these fields. In general these poly-purpose catalysts are effective for different reactions or for related types of reactions under specific temperature-pressure-concentration-space - velocity conditions and are employed under those condition ranges for each specific purpose. More will be mentioned in this regard later in these articles.

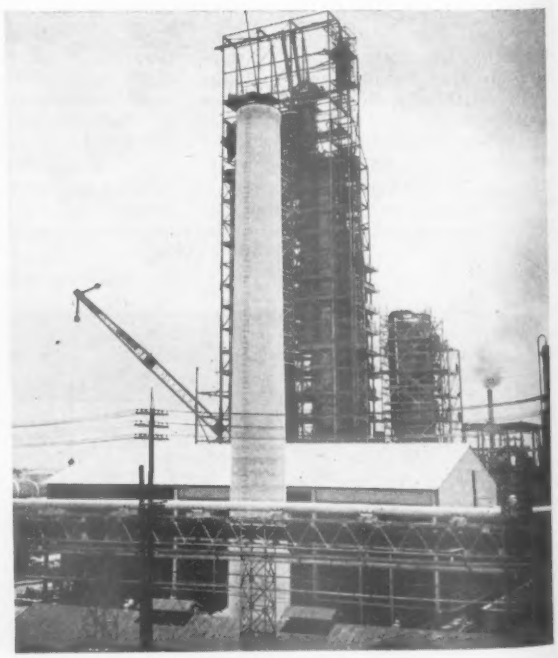
1. Cracking-Reforming Catalysts

The basic ingredients of most cracking catalysts is silica gel, alumina gel, or more frequently a mixture of the two. On occasion other metals or their oxides or salts are included, purportedly to improve efficiency or the specific action of the catalyst for a given product, but the bulk of the cracking catalyst remains one or both these oxides in various forms.

Much of the differentiation of the effect and efficiency of silica-alumina catalysts is traceable, according to technical and patent literature, to the manner of preparation of the catalyst, affecting its physical state when it reaches the reaction zone. This possibility is the more understandable since catalytic action is credited with being a surface reaction. Some authors (Ipatieff and others) believe that "centers of activity" are points, or edges, or other irregularities of the catalyst surface. Good catalysts include the filter earth and synthetic materials very high in macroscopic or microscopic porosity, a physical condition which multiplies the total exposed surface

Left: Fluid catalytic cracking unit, Associated Refineries, Duncan, Okla. Catalyst hopper is large bin, upper center. Catalyst is stored in two vertical columns seen at right. Right: Thermofor catalytic cracking unit. Through the tall scaffold-surrounded chambers tons of catalyst pass per hour





of a given weight of material to an unbelievably stupendous degree. In such case, then, the purely physical form and condition of the catalyst is second in importance only to the chemical composition and the properties of the individual elements included. The physical condition in some cases is reported to affect the final results quite as much as does choice of catalytic material.

In a recent investigation of the effect of method of preparation of catalysts on their physical structure and therefore in general on their catalyst efficiency, Elkin and coworkers (Ind. Eng. Chem. vol. 37, p. 327, 1945), prepared silica-alumina gels by (1) precipitating alumina from $AlCl_3$-water solution in the presence of silica gel slurry suspended in the solution; (2) mixing the two wet, already-precipitated gels in the form of dilute slurries; and (3) impregnating solid silica gel with, for example, aluminum nitrate solution and heating to elevated temperatures to reduce the nitrate to the oxide of alumina. These authors claim that results show conclusively that the catalysts so prepared are not simple mixtures of the two oxides as are obtained by purely physical methods of intermixing fine particles of the two. X-ray and nitrogen adsorption analyses show that for those catalyst forms precipitated "in sequence," the specific surface, that is, area of surface per unit of weight, is less than is expectable from physical mixtures of the two gels. Contrariwise, mechanical mixing of the two wet gels yields greater specific surfaces than is expectable from other considerations. Particle sizes in wet gels were found to be much smaller than in dried gels, and it is believed that addition of fine-particled alumina gel (wet) to silica also wet prevents the formation of larger particles during mixing and drying.

With this basic material, which, however, is not found in all catalysts by any means, various other metals and metal derivatives are mixed. McGrew (1-5) mixes in varying proportions of zirconia, ZrO_2, with Al_2O_3-SiO_2 for a cracking catalyst for use at 600-900° F. in a combination thermal-catalytic cracking system. In another case (1-8) calcium or magnesium silicate is heated, dissolved in mineral acid and further treated; it must have no more than 64 per cent silica, sufficient alkaline earth to render it soluble in acid, and a lesser amount of aluminum, or oxide of some other metal from Periodic Table groups III, IV, V, VI or VIII, the whole being precipitated, coagulated and dried.

Reeves (1-13) suspends a catalyst of clay, pumice, silica gel, etc., in inert gases; the suspension is commingled with the oil to be cracked. A cracking-reforming catalyst (1-14) is formed of hydrogels of silica, alumina or zirconia and used to treat mixed straight-run and cracked naphthas at 500-800° F., to saturate the olefins present. This smacks of the treating of once-cracked catalytic naphtha to decrease olefin and increase aromatics content of aviation base fuel. Shabaker (1-16) wets a dried SiO_2-Al_2O_3 gel, works it to decrease its consistency which increases on standing, and then molds the mass in a state of "decreased consistency," to make a cracking catalyst.

Proportions of two or more materials vary widely. One catalyst (1-18) is made of 2.5 to as many as 40 parts of SiO_2 to 1 part of capillary-structured alumina, with which gas is heated to 850° F. to crack. By a countercurrent operation masses of powdered Al, Zr, and Si oxides are blended intimately to make an effective catalyst (1-20). A recent patent claims a catalyst made up of silica and alumina with 0.1 to 1 per cent bismuth oxide as promoter (1-23). Hydrocarbons may be cracked effectively at 700-1,050° F. with a catalyst (1-24) composed chiefly of silica gel treated with a cerium compound in acid solution, or with a small amount of cadmium oxide, as

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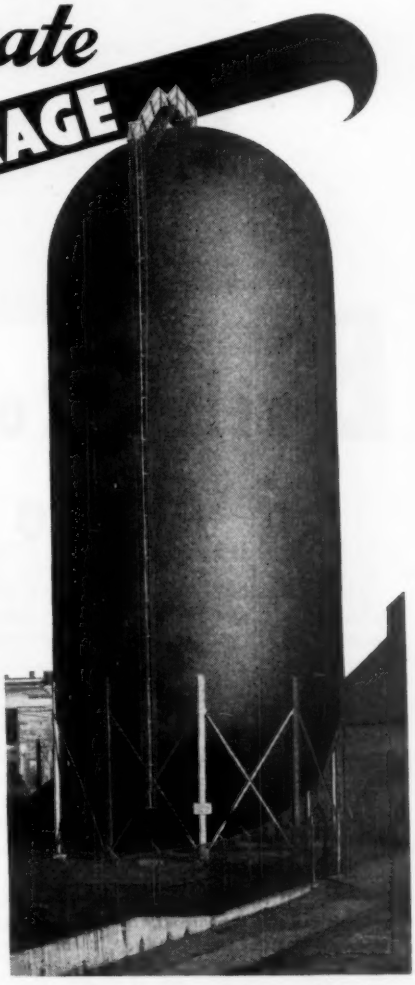

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promoters, it is claimed. A patent which points toward the Fluid catalyst system (1-30) uses an acid-treated clay or a silica gel, vaporizes the oil to be cracked with this fine catalyst, adds more catalyst and holds the two in contact for a time sufficient to obtain the desired degree of cracking. A catalyst of a Mohs hardness greater than 2.5, specific gravity of 1.5, is porous and is composed of 0.8 to 1, up to 1.2 to 1 of SiO_2 and Al_2O_3 (1-31).

Methods of special preparation are numberless. A typical patented catalyst is made by adding $AlCl_3$ to a solution of an alkali-free alkyl silicate and an alumina sol, the mix is dried and used to crack oils at 860° F. Still another (1-35) is composed of flat plates of vermiculite which is "chemically a hydrated silicate," is treated with concentrated sulfuric acid and mixed with alumina, maintaining the silica-alumina combine. Egloff (1-36) reforms a light oil with alumina and a small amount of chromia, Cr_2O_3; a heavy oil is cracked with a mixed alumina-silica catalyst, the cracked products are blended and treated again with a mixture of the two catalysts. More highly complicated catalysts are typified by that granted to Watson (1-38) which is made of silica pellets as carrier, with oxides of one or more of the metals aluminum, vanadium, zirconium, or thorium. This catalyst cracks oil at 950° F., yielding a relatively saturated gasoline in the early run when the catalyst is especially active; later, when the catalyst activity is reduced a relatively unsaturated product is obtained, and the two products are collected separately. Ruthruff (1-39) deposits an "active" MgO-SiO_2 complex on "inert" silica particles, such as in the form of pulverized sand or quartz material, the latter serving purely as a carrier for the active material. A peculiar variant of the mixed catalyst is that of Klein (1-40) in which silica gel in dried or semidried state is treated with ammonia solution, then with a solution of an aluminum or magnesium salt to precipitate the metal hydroxide which is dried to the oxide in situ on the silica "carrier." A process using the alumina-silica-zirconia type of catalyst (1-41) cracks thermally part of the light and heavy reflux condensate from the catalytic cracker, part is recycled to the catalytic step with the above catalyst. Numerous variations of this idea are suggested. What appears to be an important item in the fluid catalyst type of process is found in one patent (1-42) wherein catalytic cracking operations are carried out by circulating a pulverized catalyst in a stream of charge-stock vapors, collecting the products and the spent catalyst and regenerating the latter.

Combination of thermal and catalytic cracking is recommended by several proposed methods and sequences (1-46). A charge gas or other charge is cracked thermally and the product boiling below 450° F. is treated with an aluminum hydrosilicate (activated) at 850-1,100° F. as an isoforming catalyst, in a catalyst-to-oil ratio of from 0.001 to 1, up to 10 to 1. The length of time the catalyst is held in contact with the charge is determined by the formula

$$T = at^{0.524}$$

in which

T = tons of catalyst in the contact zone per 100 bbl. of oil charged per hour

a = a constant ranging from 0.05 to 0.005

t = the over-all residence of the catalyst in the reaction zone, in minutes

Reforming naphtha is carried out in two stages treating raw naphtha (1-48) with a "splitting catalyst" of SiO_2-Al_2O_3, then with a dehydrogenating catalyst in a separate zone, each at about 300 psi. An octane-number boost of 10 may be obtained in the first step, and more than 10 in the second step, it is claimed.

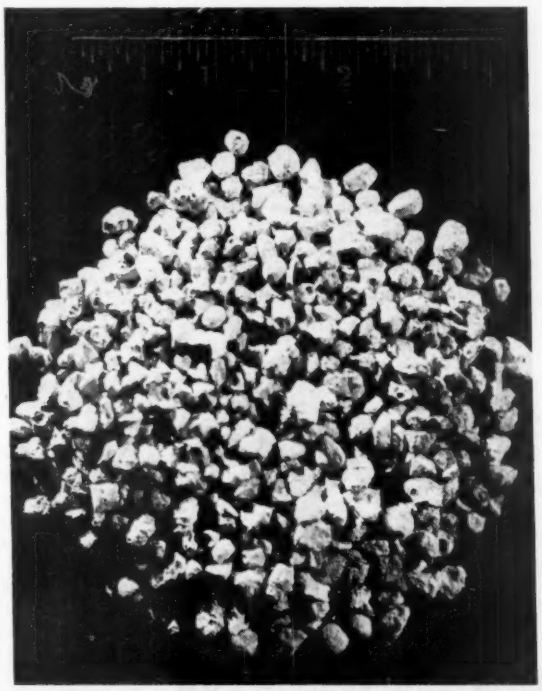
In two other instances dispersing a finely divided catalyst of any conventional type in charge vapors is claimed as efficient cracking. In one (1-50) bentonite is so suspended and heated in two zones, catalyst concentration and cracking severity in the second zone being increased by reducing velocities of catalyst and vapors. In another (1-52) an earth or other catalyst is suspended in vapor at 30-400 psi., heated for 23 seconds or longer at 1,000-1,075° F. with a catalyst-charge ratio of 1:10 to 1:2 to crack 28-52 per cent of the charge. Another catalyst system suspends the catalyst in the charge liquid, and separates it from the residual oil mixture (1-51).

Variants in Catalysts

Other materials than the silica-alumina base discussed above are employed for catalytic cracking reactions. One such catalyst is pelleted molybdenum sulfide, MoS_2, or tungsten sulfide, WS_2, both of which are understood to be good hydrogenation-cracking catalysts for coal-tar oils, for example (1-3). A cracking catalyst (1-7) of alkali metal phosphates, tungstates or molybdates, for example, sodium pyrophosphate is used until spent, dissolved in water, thus removing the carbon which is skimmed or filtered from the solution (See also 1-82). Catalyst is recrystallized from the solution, dried and reused. Blast-furnace slag supplies a catalyst (1-10) by being dissolved in concentrated HCl, H_2SO_4, or H_3PO_4, holding the solution pH at 1 to 5, coagulating the precipitate from the solution and drying after washing free of soluble materials.

Bauxite is prepared as a cracking catalyst (1-22) by heating in a reducing gas to reduce the iron present to the metallic state, contacting the bauxite at 1,000-1,500° F. to deposit carbon, oxidizing Fe to its oxide by heating with oxygen and washing out the Fe oxides. A multivalent metal phosphate such as that of aluminium, with for example 20 per cent of a fluoride such as AlF_3 which is nonvolatile below 1,200° F. is a distinctive type of cracking catalyst (1-25). Activated bentonite is claimed for use suspended in the charge (1-26), with regeneration gases washed by the charge stock to exchange heat and recover catalyst fines. The combination of a heavy metal manganite or permanganite with an oxidizing gas (1-29) as catalytic cracking catalyst is claimed to be efficient.

A metal oxide-metal silicate catalyst is claimed as an efficient crack-



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ing catalyst, such as 75-85 per cent of titanium oxide, TiO_2, plus a "copper salt containing oxygen" such as copper silicate, used at 850-1,100° F. Heat transfer and temperature maintenance is important in cracking. A typical alumina-silica catalyst is mixed with 25-40 per cent of an inert, heat-retaining material such as iron shot, pulverized quartz or the like to absorb heat from the burning of deposited carbon during regeneration and thus to utilize the retained heat in the cracking zone (1-33). Oils are cracked with a silica-base catalyst (1-49) to which magnesia, MgO, is added in various proportions, and to which also boric acid may be added as a promoter, 0.2 to 10 per cent by weight. In a variant of the alumina-silica catalyst (1-54) the alumina is gelled with hydrofluoric acid and is then mixed with the silica gel before igniting. To vary the catalytic effect a silica gel is precipitated with a hydrous oxide of vanadium, tin, chromium, molybdenum, or tellurium (1-56) for a cracking catalyst. Bentonite clay is treated with concentrated HCL or sulfuric acid (1-58) forming a hydrous Al silicate; the product is wetted with 2-10 per cent of a monobasic organic acid such as acetic, is digested and then impregnated with hydrofluoric acid, heated to 850° F. to "fix." Another product uses acetic acid as "peptizing" agent (1-73). Silica gels are impregnated with other materials, such as the catalyst made by heating moist silica gel with various proportions of ferric chloride (1-59) at 250° C., and redissolving part of the chloride in HCl to control the proportion of the chloride in the finished catalyst. A "microporous" silica is impregnated with an oxide of aluminium, magnesium, beryllium, and/or manganese for catalytically cracking oils (1-60). A combination effect may be obtained by treating an alumina gel (1-63) with hydrofluoric acid or with hydrofluosilicic acid, H_2SiF_6, forming a variable composition of silica, alumina, and fluorides or silicofluorides. Claims are made also for a cracking catalyst of a mixed halide salt such as aluminium fluochloride, $AlCl_2F$ (1-65). The impregnation idea is used in a catalyst of silica base, with which is incorporated oxides of boron or zirconium, made by adding organic compounds of either metal to silica gel and heating to reduce the promoters to the oxides (1-67, 1-68).

Titanium oxide gel is combined with 5-20 per cent of boric oxide, B_2O_3, without the silica or alumina ingredient, as one type of cracking catalyst (1-69). A type of catalyst which exercises its own temperature range control (1-70) is one combining a "Superfiltrol" type of clay with two different solids each of which has a high latent heat of fusion, the one melting at about the lower cracking temperature range, the other melting at the higher temperature range desired for operation with this catalyst. Suggested materials are $BaCl_2$-2KCl for the higher melting point, KCl-$PbCl_2$ for the lower temperature control. A combination cracking-cyclizing catalyst (1-75) is made of mixtures of oxides of Al, Si, Ni, Co, Mo, and Cr, two or more, used to crack charge at 950-1,350° F., the cracked vapors being treated with catalyst containing chromic oxide especially, at 900-1,000° F. Magnesite calcined at 1,400° F., giving a better material than that obtained at 2,000° F., is ground together with thorium oxide as a stabilizer for regeneration of the catalyst, dried 24 hours at 240° F. then for 8 hours at 1,000° F. Combination of bentonite, montmorillonite, etc., or of silica-alumina mixtures with oxides of Cr, Mo, W, or U or V (1-77c) in the proportions of, for example, 100 SiO_2: 5 Al_2O_3: 0.35 V_2O_5 yield active cracking catalysts. A somewhat different reforming-hydrogenation catalyst (1-77e) is composed of, for example, copper oxide 1-10 mol per cent, Al_2O_3 81-60 mol per cent, Cr_2O_3 18-30 mol per cent, to treat naphtha containing butanes and hydrogen in the ratio of 1-10 per cent butanes, to 0.1 to 10 per cent H_2.

Innumerable other combinations for catalysts are claimed and in some cases used commercially, although at present these developments are shrouded by necessary military secrecy. The actual practical development status of patented catalysts is in most cases unknown. Even combinations of organic with inorganic ingredients are claimed, such as the SiO_2-Al_2O_3 base material (1-83) with alkylene polyamines, such as diethylenetriamine or ethylene-diamine, of the efficacy of which nothing has been publicized. The above brief data and additional information to be found in the accompanying bibliography, while not at all exhaustive, will give a fairly comprehensive panorama of the highly complex and involved cracking catalyst situation with which we approach the postwar period.

Cracking Catalysts Bibliography

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1-65. U. S. 2,337,432, Dec. 21, 1943, Texaco, $AlCl_2F$ (dihalide or mixed halide).

1-66. U. S. 2,339,106, Jan. 1, 1944, Alien Prop. Cust. Al_2O_3, Cr_2O_3, or Group II, VI, metal oxides.

1-67. U. S. 2,339,247-50, Jan. 18, 1944, U. O. P., SiO_2 gel, B, Zr oxides.

1-68. U. S. 2,339,302, Jan. 18, 1944, U. O. P., SiO_2-ZrO_2, B_2O_3.

1-69. U. S. 2,339,838, Jan. 25, 1944, S. O. Dev. Co., TiO_2 & B_2O_3.

1-70. U. S. 2,339,894, Jan. 25, 1944, S. O. Indiana, "Superfiltrol," heat absorbers.

1-71. U. S. 2,340,007, Jan. 25, 1944, U. O. P., Al_2O_3-Al sulfate.

1-72. U. S. 2,340,698, Feb. 1, 1944, Ruthruff, SiO_2 gel, $MgCO_3$.

1-73. U. S. 2,340,935, Feb. 8, 1944, S. O. Dev. Co., Amphoteric metal oxide, organic acid.

1-74. U. S. 2,342,247 and 2,342,249, Feb. 22, 1944, S. O. Ohio, Cr & Si oxides ppt'd. continuously.

1-75. U. S. 2,342,881, Feb. 22, 1944, Lummus Co., Oxides, of Al Si, Ni, Co, Mo, Cr.

1-76. U. S. 2,343,295, March 7, 1944, S. O. Indiana, Calcined magnesite, ThO_2.

1-77. U. S. 2,343,472, March 7, 1944, Alien Prop. Cust. $MgSiO_3$, magnesium silicate.

1-77a. U. S. 2,343,649, March 7, 1944, U. O. P., Silica-alumina-zirconia, plus promoters.

1-77b. U. S. 2,343,731, March 7, 1944, S. O. Indiana, SiO_2-MgO.

1-77c. U. S. 2,343,851, March 7, 1944, U. O. P., Silica-alumina, + oxides of V, Ta or Cb.

1-77d. U. S. 2,344,911, March 21, 1944, S. O. Dev. Co., SiO_2-TiO_2.

1-78. U. S. 2,345,600, April 4, 1944, S. O. Indiana Al_2O_3 gel, ppted. from Amalgam.

1-79. U. S. 2,345,718, April 4, 1944, S. O. Dev. Co., Al_2O_3-Cr_2O_3.

1-80. U. S. 2,347,231, April 25, 1944, Alien Prop. Cust. SiO_2-Al_2O_3 + Al, B, Mg, Be Mn.

1-81. U. S. 2,347,648, May 2, 1944, U. O. P., SiO_2-Al_2O_3-ZrO_2.

1-82. U. S. 2,347,955, May 2, 1944, Union Oil Co., Alkali phosphates.

1-83. U. S. 2,348,072, May 2, 1944, U. O. P., SiO_2-Al_2O_3 + polyamines.

1-84. U. S. 2,348,647, May 9, 1944, S. O. Dev. Co., Al oxide, alkyl silicate, alcohol, ethylene oxide.

1-85. U. S. 2,348,702, May 9, 1944, U. O. P., Al_2O_3-$MgCl_2$.

1-86. U. S. 2,348,780, May 16, 1944, P. P. Co., Bauxite.

1-87. U. S. 2,349,243, May 23, 1944, Houdry, Zr phosphate on SiO_2 etc.

1-88. U. S. 2,349,827, May 30, 1944, U. O. P., $AlPO_4$ or $Mg_2P_2O_7$, etc., on carriers.

1-89. U. S. 2,351,624, June 20, 1944, U. O. P., Cr_2O_3-TiO_2.

1-90. U. S. 2,352,236, June 7, 1944, U. O. P., "Siliceous material."

1-91. U. S. 2,352,416, June 27, 1944, U. O. P., SiO_2-ThO_2.

1-92. U. S. 2,353,119, July 4, 1944, Cities Service, Clay, activated carbon.

1-93. U. S. 2,353,399, July 11, 1944, Sinclair, (Reforming) SiO_2-Al_2O_3.

1-94. U. S. 2,353,624, July 11, 1944, Ruthruff, Pb, Zn Chromite, etc.

1-95. U. S. 2,355,831, Aug. 15, 1944, S. O. Indiana, Cr, Mo or V oxides.

1-96. U. S. 2,356,697, Aug. 22, 1944, S. O. Dev. Co., Oxides of Cr, V, W, Mo.

1-97. U. S. 2,356,711, Aug. 22, 1944, Szayna-Travis, "Inhibited Ni catalyst."

1-98. U. S. 2,356,717, Aug. 22, 1944, S. O. Dev. Co., "Solid which yields NH_3 when heated."

1-99. U. S. 2,356,954, Aug. 29, 1944, Sinclair, Metal, coated with Al, Cr, or Zr oxides.

1-100 U. S. 2,356,978, Aug. 29, 1944, U. O. P., Mixed B & Zr oxides.

1-101. U. S. 2,357,315, Sept. 5, 1944, U. G. I., Ca, Cr, Sr, Mn oxides by electric discharge.

1-102. U. S. 2,357,365, Sept. 5, 1944, Kellogg Co., Mo or Cr oxide on alumina (Reform).

1-103. U. S. 2,357,570, Sept. 5, 1944, Socony-Vacuum, Film of Cat. on continuous metal ribbon.

1-104. U. S. 2,360,552, Oct. 17, 1944, U. O. P., Alumina, Chromia, ZnO.

1-105. U. S. 2,366,217, Jan. 2, 1945, Ruthruff, Vermiculite, sulfuric treated, 10% untreated bentonite.

1-106. U. S. 2,366,218, Jan. 2, 1945, Ruthruff, Oxides, of W, Mo, Zn, Mn.

1-107. Brit. 545,697, June 9, 1942, S. O. Dev. Co., Regeneration in gaseous medium.

1-108. Brit. 546,822, July 31, 1942, Houdry, Siliceous material.

1-109. Brit. 547,246, Aug. 20, 1942, S. O. Dev. Co., Alumina, Cr, Mo oxide, organic acid.

1-110. Brit. 549,547, Nov. 26, 1942, Houdry, Silica-Alumina.

1-111. Can. 408,593, Nov. 10, 1942, S. O. Dev. Co., Treated clay.

1-112. Can. 411,666, April 6, 1943, S. O. Dev. Co., Silica-alumina and CdO, or ZnO.

1-113. Ger. 716,239, Dec. 18, 1941, Ruhr-Chemie, Fuller's earth, borates.

1-114. Ger. 736,093, April 29, 1943, I. G. Farben, Mo, W sulfides, etc.

1-115. Ger. 736,932, May 20, 1943, I. G. Farben, Na silicate, aluminate mixtures.

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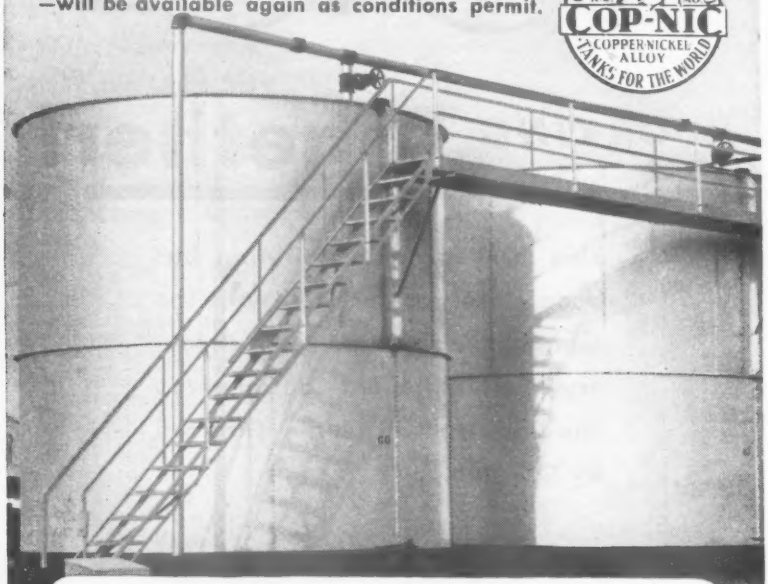

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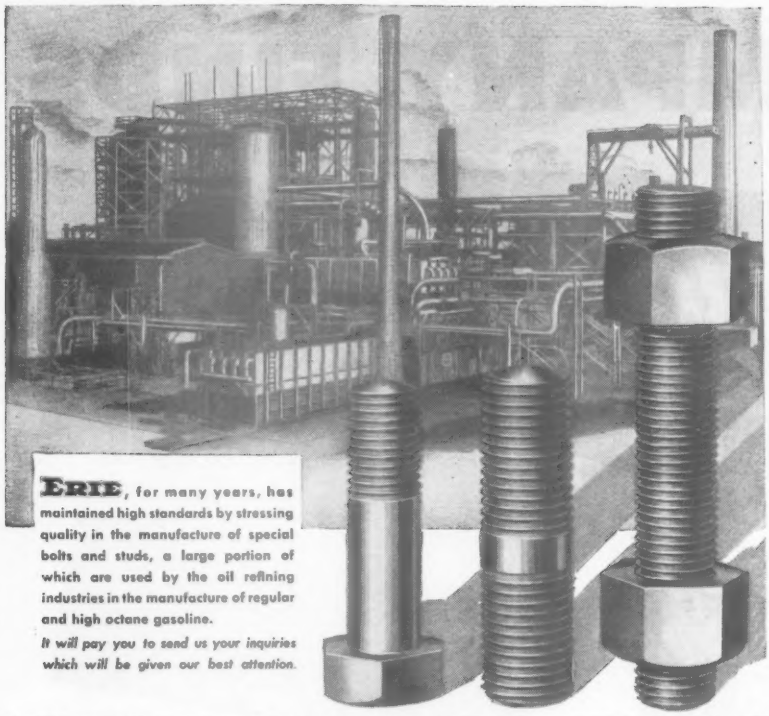

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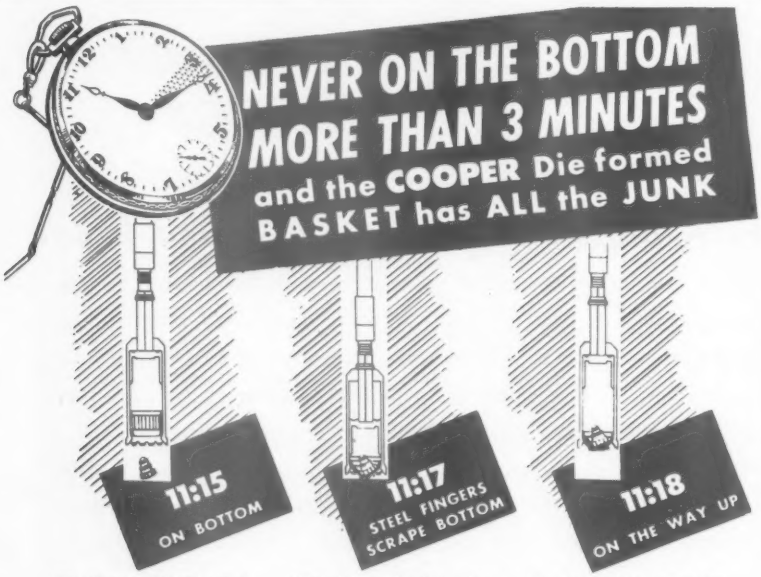

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Regulation of I.B.P. and E.P.

THERE are four main fundamentals of tower operation in the regulation of the boiling range of the products produced.

1. Yields are primarily a function of the composition of the crude oil.

2. Fractionation or number of plates alters the boiling range of the products as measured by the I.B.P. and E.P. of a standard A.S.T.M. distillation.

3. Initial boiling point is always low for products from a multidraw tower and must be improved by steam stripping or rerunning.

4. The end point of products from multidraw towers is governed by the number of plates between products.

All of these rules or fundamentals are interrelated, particularly because the composition of the crude oil (Rule 1) affects all of the other rules.

Yields. — The T.B.P. distillation curve shown in Fig. 1 indicates that the yields from this Mid-Continent crude oil will be about (see Notebook 24, December 30, 1944):

	Per cent	End point
Gasoline	30	410
Kerosene	10	510
Distillate	15	630

If perfect fractionation (infinite plates and infinite reflux) were attained, the yields would be the same but the end points would be lower, and if true boiling point distillations of the products were available they would show exactly the same distillation range as in Fig. 1, namely for kerosene exactly 430° to 530° F.

In actual towers the fractionation is not perfect but since the heavy end of the gasoline is lost into the kerosene, and the lightest end of the kerosene is lost into the gasoline, the yield of each of them is little altered by the degree of fractionation attained. Only when a very small product lies between two very large products are the yields altered by fractionation. In such a situation the yield of the small product will be much smaller than indicated by the crude-oil distillation unless an enormous number of plates are employed.

Initial boiling point.—In multidraw towers the vapors of the top products always pass the sidedraw plates and hence the products withdrawn from the side of the tower will always absorb some of the vapors of the lighter products. Little can be done about this in the fractionating tower but the sidedraw products can be stripped with steam or they can be redistilled. Of course the I.B.P. can be lowered by making a wider-boiling-range material. For example (see Fig. 1), by reducing the top temperature of the tower so that only 25 per cent of gasoline is produced, and by opening the kerosene sidedraw valve, it is possible to make a 15 per cent kerosene without materially changing the end point of the kerosene. Note that it is necessary to reduce the gasoline yield if the end point of the kerosene is to stay the same, for if the kerosene draw valve is simply opened, the I.B.P. will stay about the same and the end point will go up. Steam strippers were discussed in Notebooks Nos. 41 (May 12) and 51 (July 21).

End point.—Opening of the sidedraw valve increases the E.P. by letting high-boiling vapors rise to the sidedraw plate rather than be condensed by internal reflux. In other words, less reflux flows to lower parts of the tower and hence additional heavy vapor is allowed to come to the sidedraw plate. Thus, if the kerosene draw valve is opened (see Fig. 1), the end point will increase but the I.B.P. will stay about the same. Note that the distillate draw valve must be closed by a corresponding amount because only 55 per cent is being vaporized; thus it would be impossible to make 15 per cent of distillate and at the same time make more than 10 per cent of kerosene. Of course, the vaporizer temperature could be increased so that more than 55 per cent of the crude oil is vaporized.

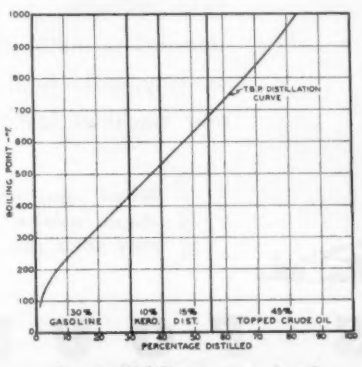

Fig. 1—Mid-Continent crude oil

To a limited extent, E.P. is changed by the number of trays between cuts. Thus, the use of 10 trays between kerosene and distillate rather than 4 trays will, (other conditions being unchanged) reduce the end point of the kerosene by 10°-15°. Such adjustments can be made by moving up or down on the sidedraw manifold lines provided on most towers.

Summary

A. To increase end point without altering I.B.P. open the sidedraw valve (or speed up the withdrawal pump) and close the draw valve of the next lower product by a corresponding amount. The reverse is done to decrease the end point. Increasing the number of trays between the product and the next lower one also slightly reduces the end point.

B. To increase initial boiling point without altering E.P. close the sidedraw valve and open the draw valve of the next higher product by a corresponding amount. The reverse is done to decrease the I.B.P. Also use more stripping steam.

C. To produce a narrow boiling range use more steam for stripping and use as many plates as possible above and below the fraction and particularly below.

Additional discussions on tower operation will be published in Notebooks Nos. 57 (Dirty Streams), 58 (Kerosene Stripping), 60 (Bringing on Stream), and 68 (Getting Maximum Tower Capacity).

No. 56 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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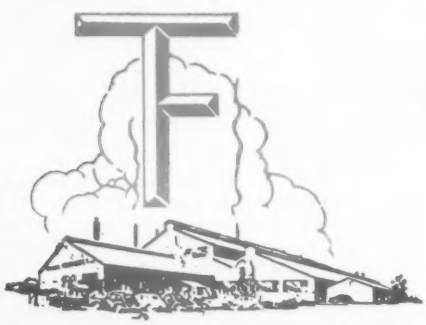

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A FEATURE OF THE OIL AND GAS JOURNAL

Methods of Testing Salt Water for Injection Into Oil Sands

SALT water, after filtering and before injection into an oil-sand, is tested to determine if there are any unstable substances dissolved in the water which would tend to form insoluble precipitates upon standing, upon contact with air, or upon contact with hydrogen sulfide. These substances are: (1) ferrous bicarbonate, which reacts with air to form insoluble ferric hydroxide, and with hydrogen sulfide to form insoluble ferrous sulfide; (2) calcium bicarbonate, which reacts with air, particularly by agitation, to form insoluble calcium carbonate; (3) silica, which reacts with water to form insoluble silicic acid, and (4) the pH value, to determine corrosiveness of the water.

In addition to these tests, it is desirable to test the total sulfates in the water to determine the amount of sulfate reduction due to bacteria and other means. If loss in sulfate is large the presence of bacteria and undesirable reducing conditions are indicated. Also, it is advantageous to test the amount of floc in suspension in the water going into the filter, in open water-disposal systems, to determine the efficiency of settling of precipitates and the load of insoluble material which has to be handled by the filters.

Finally, it is important to test the efficiency of the aeration and the extent of oxidation going on in the water. This latter test is accomplished best by measuring oxidation reduction potential by means of a pH meter. All these tests are necessary to determine if the water, after filtering, is free from the substances which form floc. Otherwise, some precipitation will take place after filtering and the injection wells will become clogged.

Recently developed rapid methods for determining these essential factors are described in following paragraphs:

Rapid method for determining soluble iron in the water by means of an electrometer.—Measure, by means of pipettes, 50* ml. of the water sample into a 400-ml. beaker, add a few drops of hydrochloric

*In case there is only a very small amount of iron in the water, double or quadruple the sample.

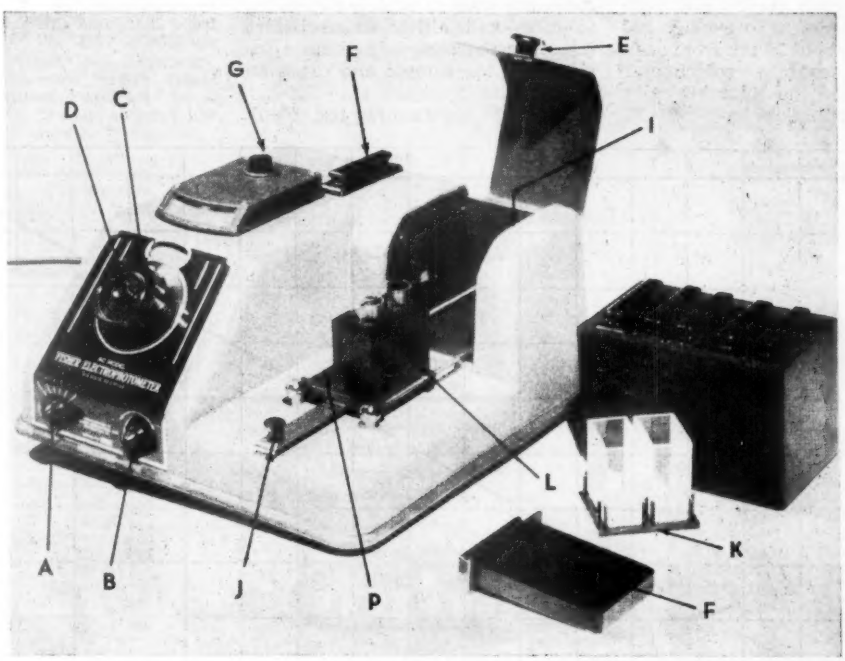

Fig. 1—Electrophotometer used in determination of iron by colorimetric method. A, knob for light-intensity control; B, null knob; C, dial knob; D, lamp switch; E, compartment cover; F, light filter; G, galvanometer knob; I, compartment for testing water samples; J, handle for sliding sample tubes; K, holder for rectangular sample tubes; L, sliding holder for water sample tubes

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

acid to make the water acidic, and add bromine water drop by drop until the water becomes yellow and contains an excess of bromine. Place the beaker on a hot plate and boil until no odor of bromine remains. Remove the sample from the hot plate and stir in ammonia until the water is basic when tested with litmus. Place the beaker again on the hot plate and heat quietly for 5 minutes. Filter off the ferric hydroxide onto a No. 30 Whatman paper and wash several times with dilute ammonia water. Place a 100-ml. volumetric flask under the filter and, with the aid of a wash bottle containing 1:1 hydrochloric acid, wash and dissolve the iron hydroxide on the filter and wash it through the filter into the volumetric flask. Wash several times with the acid and the water.

Next add approximately the same volume of the dilute acid used in washing the iron precipitate to an empty 100-ml. volumetric flask to be used as a blank. Add 1 ml. of 50 per cent thioglycolic acid to each flask. Next add concentrated ammonium hydroxide in 1-ml. increments to each flask until each mixture is made up to exactly 100 ml. Pour out about 25 ml. from each flask into separate colorimeter tubes, and read the color intensity in an electrophotometer (Fig. 1), or other color meter using a 535-millimicron filter, and compare with the blank sample for reference in setting the instrument. Total iron in the water in milligrams can then be read directly from the instrument's calibration chart (Fig. 2). Calculate the number of milligrams in 1 l. of water by multiplying the answer by 20.

Use of an electrophotometer.— The electrophotometer is an instrument for measuring color intensity, from which iron content, silica content, and turbidity of the water can be quickly determined. It consists of a photoelectric cell which generates a small electrical current proportional to the intensity of the light passing through the solution. A galvanometer shows the amount of current generated. For the iron determinations, the green 535-mm. filter is placed in the instrument and the tube containing the unknown sample inserted. Knob A is turned to the "ADJ GAL" position to set the galvanometer needle exactly in line with the hairline by turning the knob G on top of the instrument. The sample tubes are washed with hot cleaning solution and either dried before inserting the sample or rinsed inside with the sample and dried on the outside.

The tube containing the blank is kept in the instrument throughout the determinations, and for accuracy is checked against each sample before each reading. Place the blank tube, containing all the reagents contained in the samples and the tube containing the sample to be tested in adapter L, close lid E, set dial C to zero reading. With the blank tube in the light path, adjust the initial null knob B, when button D is depressed, until the galvanometer is in line with the hair line. Then place the sample tube in the light path, and turn the calibrated dial knob C until the galvanometer needle shows no deflection when the button D is depressed. A reading taken on scale A indicates the percentage light transmission through the solution. Finally construct a curve plotting readings from scale B versus concentration of solution for a series of known standards. From this curve the reading from scale B for an unknown can be converted into the desired answer (Fig. 2).

Reference

1. Koenig, R. A., and Johnson, C. R., Spectrophotometric Determination of Iron: Jour. Bio. Chem., Vol. 142, No. 1, pp. 233-238, 1942.

2. Colorimetric Analysis With the A C Model Fisher Electrophotometer: Published by Fisher Scientific Co. and Eimer and Amend, pp. 1-15.

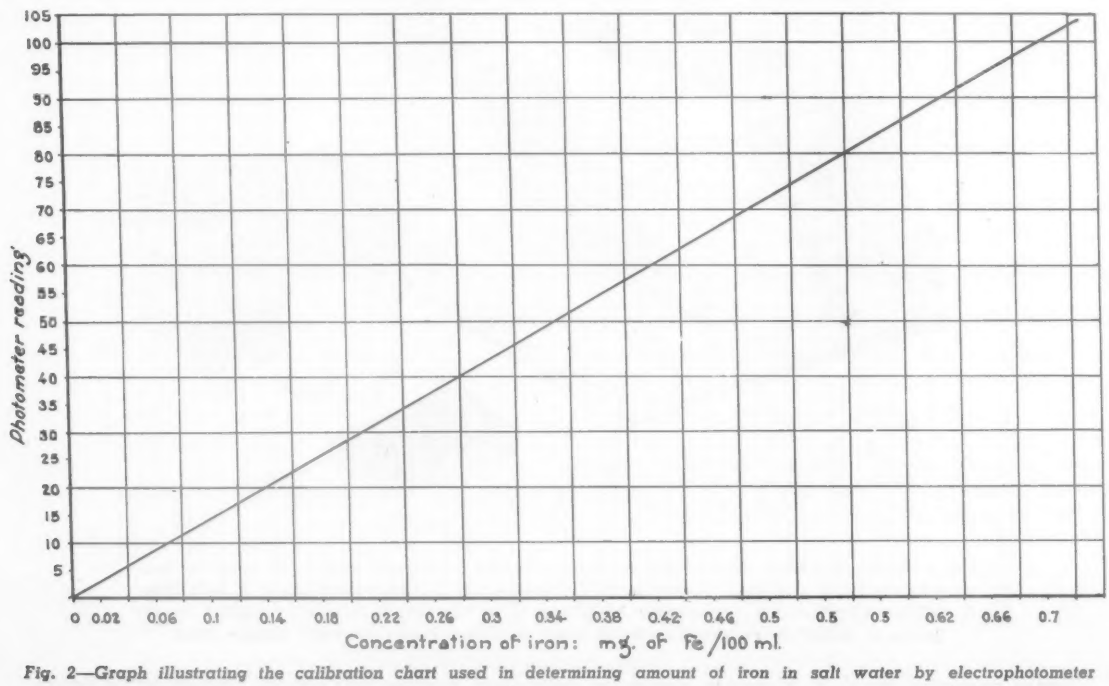

Fig. 2—Graph illustrating the calibration chart used in determining amount of iron in salt water by electrophotometer

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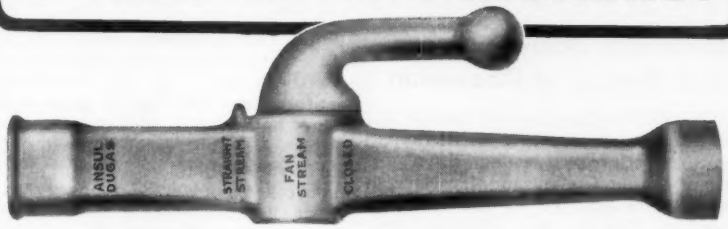

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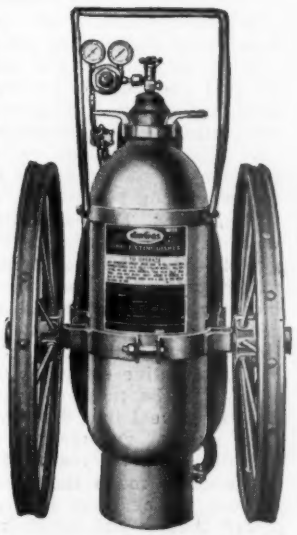

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Natural Gas

Insurance Rates on Butane Gas Subject of Discussion

AUSTIN.—Handlers of butane gas in Texas are meeting difficulty in getting insurance rates fixed for their commodity in compliance with a measure enacted by the last legislature. The new law, effective September 4, requires that butane dealers shall carry a minimum of $10,000 personal-injury and $5,000 property-damage insurance.

Insurance companies are reluctant to write the butane insurance. Their view is that the gas is so powerful that if it explodes there may be heavy loss of property or life or both. Also, the companies say, there is insufficient data available on underwriting such risks.

The state insurance commission has under advisement various plans for fixing rates which companies may charge.

Meantime, directors of Texas Butane Dealers Association have authorized formation of an insurance company to underwrite the new policies.

Use of Atom Ends Dispute Over Gas, Says Ferguson

WASHINGTON. — All argument concerning restrictions on exportation of natural gas and curbing of its end use should be closed, according to John A. Ferguson. executive director of Independent Natural Gas Association of America, commenting on the use of the atom for generating power.

"Certainly," Ferguson said, "those who have contended that natural gas should be kept at home in the major producing states to attract industry there and for use of future generations in those states can no longer rely on that argument.

"Conservative estimates made recently by the most competent authorities reveal that there are sufficient natural gas reserves now to last for some 50 years. If science continues to make the progress on the use of the atom in generating power that it has made in recent years it is not impossible that natural gas, along with gasoline, coal, electricity and all forms of power generation could become obsolete before the present known reserves of any of the depletable resources are utilized.

"A development such as this (atomic power) is a complete answer to those who urge the hoarding of natural gas for future generations. The natural-gas industry has long contended that technological developments would always provide sources of power and energy. It is unreasonable to argue that the owner of a commodity such as natural gas should be denied the right to market it and in 25 or 50 years be faced with obsolescence.

"The coal and railroad industries have fought the competition of natural gas on the theoretical grounds that natural gas reserves were rapidly becoming exhausted and therefore that the gas should not be exported from the producing areas nor be used for what they call 'inferior' purposes. This new announcement regarding atomic power, it seems to me, has now thoroughly exploded their arguments.

"Coming as it does shortly before the beginning of the Federal Power Commission natural-gas hearings it seems that most, if not all, of the opposition to the position taken by the natural-gas industry concerning exportation and end use has been left high and dry.

"In the light of developments, any effort to convince FPC that natural-gas markets should be restricted in any way would appear foolish."

Louisiana Officials Pledge Natural-Gas Conservation

BATON ROUGE. — Wholehearted support of the state's legislative mandate directing rigid conservation of natural gas is promised in companion statements issued by Gov. Jimmie Davis and Conservation Commissioner Joseph L. McHugh, who declare themselves to be in "complete accord" concerning the program, notwithstanding rumors to the contrary.

The governor said there was no foundation for any doubt as to unity of purpose of the executive and conservation departments. McHugh, agreeing, pledged his cooperation and advanced a six-point program opposing waste of state gas in areas with coal or hydroelectric power, and proposing a study toward statewide gas proration.

The state natural gas conservation committee, appointed by Governor Davis received a $100,000 appropriation with approval of the legislature. It met this week to consider a resolution reaffirming its support of the policy set forth by the 1942 legislature.

The state for several years has officially opposed plans to export gas from Louisiana.

FPC to Receive Facts and Figures on Natural Gas

Significant facts and figures on natural-gas production and conservation will be submitted to Federal Power Commission at hearings to be held in several parts of the country. Hearings thus far announced include Kansas City, September 18; Oklahoma City, October 9; New Orleans, October 31; Dallas, November 27.

State groups, natural-gas organizations, and key men in the industry have been making thorough preparations for presentation of their case. E. Buddrus, Chicago, president of Panhandle Eastern Pipe Line Co., is chairman of a steering committee comprising 21 leaders in the natural-gas business. Chairmen of subcommittees are: Natural-gas production and gathering, E. L. Rawlins; chemical use of natural gas, Richard Alden; gas reserves, W. H. Wildes; state commissions and public interest, D. A. Hulcy; interstate natural-gas pipe-line economics, E. V. Kesinger; natural-gas utilization, end use, and competitive fuels, R. H. Hargrove.

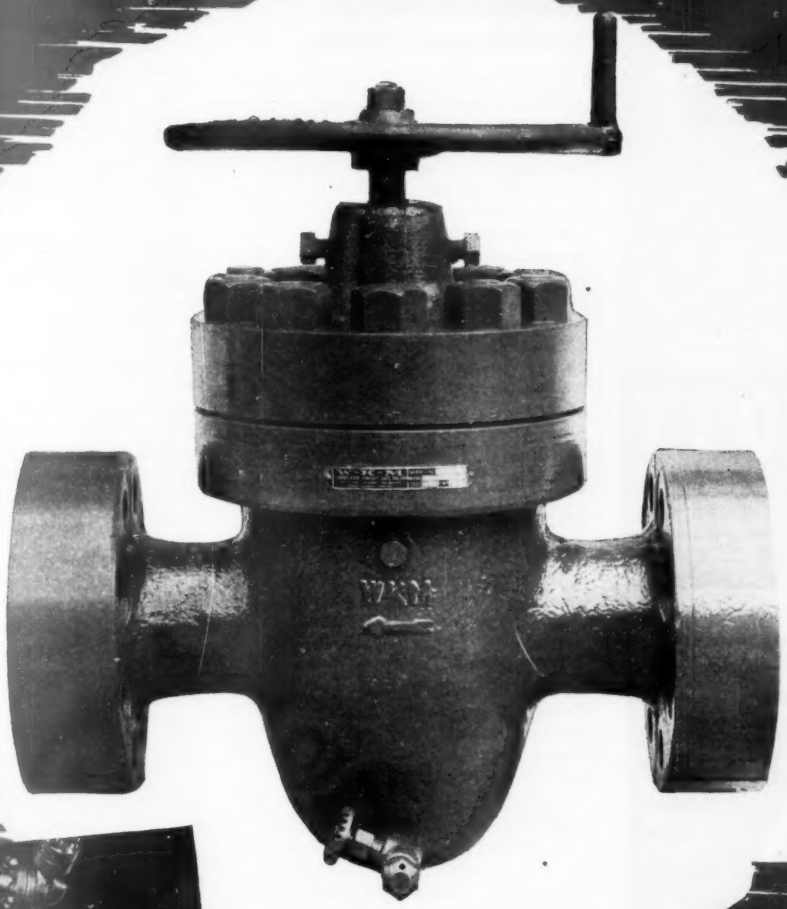
Gov. Andrew Schoeppel, Kansas, chairman Interstate Oil Compact Commission, is to represent that body at the hearings. Gov. Robert S. Kerr, Oklahoma, has appointed the Oklahoma Corporation Commission and members of its staff to represent the state. Gov. Coke Stevenson, Texas, has appointed a special committee, headed by Olin Culberson, chairman of the State Railroad Commission, to represent that state. Mississippi's Oil and Gas Board, at the instance of Gov. Tom Bailey, is preparing a brief for presentation at the New Orleans hearing.

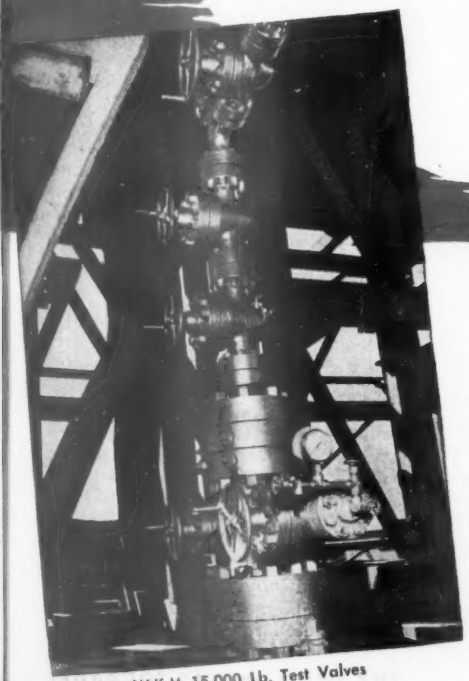
Cycling

Shell and Lone Star to Run Chapel Hill Plant Jointly

AUSTIN. — The Texas Railroad Commission has given permission to Shell Oil Co., Inc., and Lone Star Producing Co. to operate jointly a cycling plant in the Chapel Hill area of Smith County. The commission canceled a special order permitting Shell individually to operate the plant.

W-K-M first with 15,000 pound test VALVES





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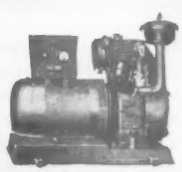

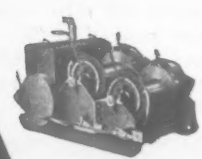

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REFINING

Premium Gasoline Specifications Raised

NEW YORK.—United States refining licensees of the Ethyl Corp. were notified last week of an increase in specifications for premium gasoline. The increase, according to Earl W. Webb, president of the Ethyl Corp., is effective at the earliest permissible contract date which is November 15. Webb stated, however, that under existing circumstances oil companies may wish to improve the quality of premium gasoline as soon as may be practicable. New minimum specifications will be 78 octane (A.S.T.M.) at point of sale.

Higher Price for Gasoline Imperative, Says Nixon

DALLAS.—An immediate increase of 1 cent a gallon in the price of gasoline, with corresponding increases for other oil products, is declared to be imperative by Maston Nixon, president of Texas Mid-Continent Oil and Gas Association. These higher prices, he says, would provide an increase of 35 cents a barrel for crude oil to save the independent producer from ruin.

"Approximately 2,323,712,000 bbl. of crude oil have been produced from Texas wells since Pearl Harbor and put into the fight at prewar prices," Nixon said in a prepared statement.

"At the same time, the user of civilian gasoline has paid the prewar price at the pump for a gallon of gasoline that still measures 4 quarts. It hasn't been trimmed down like the length of our shirt tails and many other things we buy. High wartime costs of oil production have been absorbed by the crude producer, but now he is faced with prewar allowables and prices. He must, however, retain war costs to find and produce crude oil. The independent producer will be wiped out in the immediate postwar adjustment unless he gets relief at once.

"Certainly such treatment is not proper regard for the tremendous war job that has been done. Steps should be taken to raise gasoline prices 1 cent per gallon with corresponding increases in other products to the end that an average increase of 35 cents per barrel in crude postings be established at once.

"The oil industry of Texas is proud of its part in supplying the mobile power to win. Users of gasoline would gladly pay this increase in fairness to an industry that has contributed so lavishly of its resources to help win the war."

Direct Amination Process Developed by Sinclair

NEW YORK.—A method of producing organic nitrogen compounds by direct amination of olefins has been developed by Sinclair Refining Co., according to E. W. Isom, vice president directing the research and development. Ethylene and propylene, for example, available in refinery gas or derivable from propane, are reacted with ammonia to make nitriles and amines. Five patents have been obtained and other applications, describing new chemicals and processes, are pending.

The new process accomplishes organic nitrogen fixation by a catalytic reaction of ammonia with components of refinery gases which are now used for fuel. The direct amination employs the lowest-cost sources of both reactive nitrogen and carbon compounds. Acetonitrile, propionitrile, and butyronitrile are the primary products from ethylene and propylene. Pilot-plant operation has established the production of these compounds and many derivatives as pure chemicals.

Acetonitrile, acrylonitrile and ethyl, isopropyl and normal butyl amines are examples of known industrial chemicals which can be manufactured economically by the new process. Acrylonitrile is produced now for polymerization with butadiene to yield oil-resistant rubbers, the demand for which will increase significantly. Many new polymers and industrial syntheses are expected as soon as acrylonitrile can be produced more economically. Amines are required for rubber chemicals and other important syntheses, and a greater development is probable when this important class of organic bases is more extensively available.

Propionitrile, butyronitrile, normal propyl amines, and isobutylamines potentially are new industrial chemicals. A market survey is being conducted for Sinclair by Har-

shaw Chemical Co. as distributing agent for information and samples. Numerous chemicals which have not been available previously for industrial use and many new derivatives are said to hold great promise for future developments of pharmaceuticals, insecticides, fungicides, bactericides, solvents, intermediates for dyes, rubber, photography, and plasticizers, and synthesis of new rubbers, resins and plastics.

Cornerstone for Oil-Shale Research Laboratory Laid

LARAMIE, Wyo.—Government officials, along with leaders in civic, industrial, and educational fields, were among those invited to attend ceremonies here August 25 marking the cornerstone laying for the $534,000 oil-shale research and development laboratory under construction for the Bureau of Mines. The stone was to be laid by Sen. Joseph C. O'Mahoney, of Wyoming, who sponsored in the United States Senate the synthetic liquid-fuels legislation under which this laboratory and other research facilities are being built to determine the best methods of converting the nation's immense deposits of oil shale and coal into a lasting supply of oil and gasoline.

U. S. Senator Edward V. Robertson, Cody, Wyo.; Representative Frank A. Barrett, Lusk, Wyo.; Govs. Lester C. Hunt, of Wyoming, and John C. Vivian, of Colorado; Dr. G. D. Humphrey, president of University of Wyoming; Dr. R. R. Sayers, director of the Bureau of Mines; R. A. Cattell, chief of the petroleum and natural gas division; H. P. Rue, supervising engineer of the bureau's petroleum and oil-shale experiment station at Laramie, and H. M. Thorne, engineer in charge of oil-shale research and development laboratories, were among expected guests.

The laboratory, an integral part of the national synthetic-liquid fuels program, is being built on the University of Wyoming campus on land donated by the university. The structure, of reinforced concrete faced with native stone, conforming in general appearance with other new buildings on the campus, will be three stories high with four floor levels, 192 by 59 ft.

Facilities will be provided for laboratory and small pilot plant experimental studies on processes for refining shale oil, developing and testing retorts, and other research.

Associated Refineries Plant Receives Notice to Close

DUNCAN, Okla.—Notice to shut down operations within 30 days has been received by Associated Refineries, Inc., which for a year has produced 100-octane aviation fuel at its plant here. About 650 workers are employed. A group of Oklahoma and Texas refining companies operate Associated, of which M. Lloyd Freese, Tulsa, is president and L. B. Simmons, Duncan, board chairman.

Walter Manz, plant superintendent, who received the closing order from Reconstruction Finance Corp., said the refinery would be placed on a "standby" basis, but how many employes would be retained was not disclosed.

The refinery, which cost approximately $15,000,000 began operation July 15, 1944, and since that time has produced more than 1,750,000 bbl. of 100-octane fuel. Some of this went to the European war theater, but most of it was used in training at air fields in Oklahoma, Texas and New Mexico.

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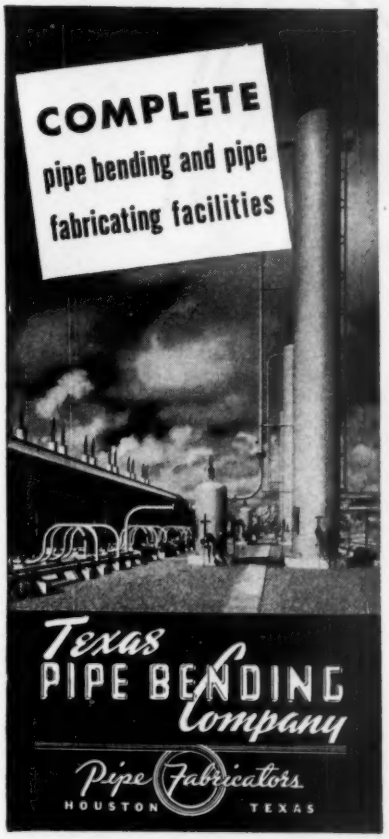

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PIPE LINES

Arabia Opposes Lines Across Other Territory

The Saudi Arabian Government has notified American oil companies with concessions in that country that it opposes the laying of pipe lines in territory which is not exclusively Arabian. The government statement apparently referred to Haifa, where the population is mixed, or to the Jewish coastal areas of Palestine. It suggested that the companies use Gaza in southern Palestine as the Mediterranean terminus of their pipe lines.

McCarthy to Lay Winnie-Orange Line

Glenn H. McCarthy is starting construction of 45 miles of 10-in. and 12-in. line from his natural gasoline plant at Winnie, Tex., to the E. I. duPont de Nemours & Co., Inc. salt and nylon plant at Orange, Tex. The contract has been awarded to J. R. Horrigan Construction Co., which has commenced operations in the field.

The Horrigan organization is finishing the reconditioning of 40 miles of 8-in. for Humble Pipe Line Co. in the vicinity of Benavides, Tex. By August 25 it will complete 25 miles of 6-in., 8 miles of 4-in. and 1½ miles of 12-in. for Sun Pipe Line Co. from Delhi, La., to the Mississippi River.

Memphis Natural to Complete Project

The Memphis Natural Gas Co. plans to build added pipe lines into the Monroe, Louisiana, field, despite possibilities that the U. S. Supreme Court may rule against use of the lines to transmit gas to Memphis.

The decision was announced by Harry Mann, Memphis Natural president, after stockholders voted at Dover, Del., for immediate construction of the missing links in the Memphis-Monroe pipe line.

Mann expected work to get under way soon and to be completed by November 1.

Pending before the U. S. Supreme Court is an appeal by the state of Louisiana from the Fifth Circuit Court of Appeals at New Orleans which upheld the Federal Power Commission's grant of a certificate of necessity and convenience to Memphis Natural.

United Carthage Line Is Under Construction

Construction of new facilities for the Carthage field of Panola County, East Texas, is under way with work started on a 24-in. pipe line, to be completed by January 1, 1946. Work on a gasoline plant will start in the fall.

United Gas Pipe Line Co.'s 143-mile line will connect with Tennessee Gas & Transmission Co.'s 24-in. line at Monroe, La. Approximate cost will be $7,261,000 with capacity for 310,000,000 cu. ft. of gas per day.

O. C. Whittaker Co. is contractor. Associated Contractors & Engineers and O. E. Dempsey Construction Co. participate in the project. Also under construction by United is a 22-mile gathering system in the Car-

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thage field which will connect with an absorption gasoline plant now being built.

Hydrocarbon Research, Inc., is to start manufacturing of high-octane gasoline from natural gas, it was announced by P. C. Keith, president of the company. Construction of the plant will start this autumn with completion due early in 1947. The plant will use 70,000,000 cu. ft. of gas per day to make 7,000 bbl. of finished products.

Kansas-Nebraska Seeks FPC Permit

Hearing on an application of the Kansas-Nebraska Natural Gas Co., Inc., to increase its pipe-line facilities from the Hugoton gas fields into Nebraska were held before Max Baron, Washington, examiner for the Federal Power Commission. A decision on the case is expected next week.

Permission to construct 20 miles of 12¾-in. pipe in Phillips and Rooks counties, Kansas, was asked by L. E. Fisher, Chicago, company president.

The company has begun preliminaries to construction under a temporary certificate dated July 11. The lines are expected to be completed within 60 days after a decision.

Requests to install and operate an additional compressor unit at Scott City, Kans., and to remove a compressor station from Elm Creek to Holdrege, Neb., were also filed.

China Plans 1,000-Mile Yumen-Kwangyuen Line

The China National Resources Committee is planning construction of a 1,000-mile pipe line from Yumen in Kansu Province to Kwangyuen, according to reports. The project is said to be part of a program connected with the further development of oil production in the Yumen district.

The New York office of the China National Resources Committee, under the direction of S. Y. Wang, is located at 111 Broadway.

Pipe Lines Contract Aerial Patroling

Standish Pipeline Co. and Phillips Petroleum Co. have contracted with the firm of Overstreet & Clay for aerial patrolling of their gas systems. The Standish flight starts at Okmulgee and extends north from Oklahoma City to Thrawl, Kans., and Kansas City. There is a branch running from Thrawl to Lyons. The Phillips contract calls for patrolling its products line from Borger, Tex., to St. Louis.

The contractor has extensive postwar plans. It is considering the use of radio in the pipe-line pumping stations along the line. This will allow the pilot to converse with station employes without landing. Under present system, pump stations can only signal planes by colored flags.

Another improvement will be the use of helicopters, which will permit the inspector to land at the scene of pipe break and ascertain the degree of damage. It would also be safer than patrolling by usual types of planes.

Experiments are being conducted to use aerial photography on gasoline leaks that are hard to find. In many cases discoloration will show up on a film that is not ordinarily visible.

Humble Plans Outlet For Sand Flat Pool

First outlet for the Sand Flat Paluxy sand pool of northern Smith County, East Texas, is planned by Humble Pipe Line Co., which will build a 6-in. line from the field to extend northeast to connect with the company's Hawkins - Longview system of 10 in. diameter. This field was brought in in 1944 and has been without a pipe line since that time.

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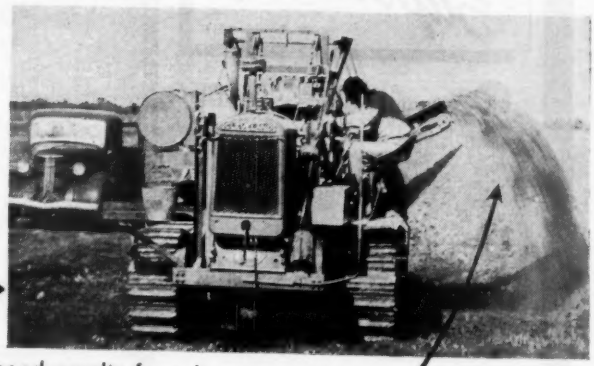

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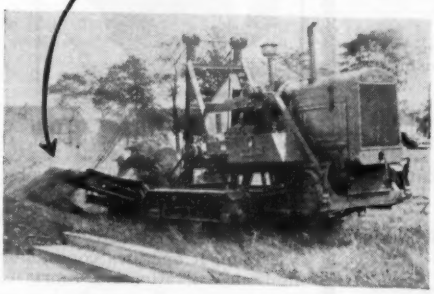

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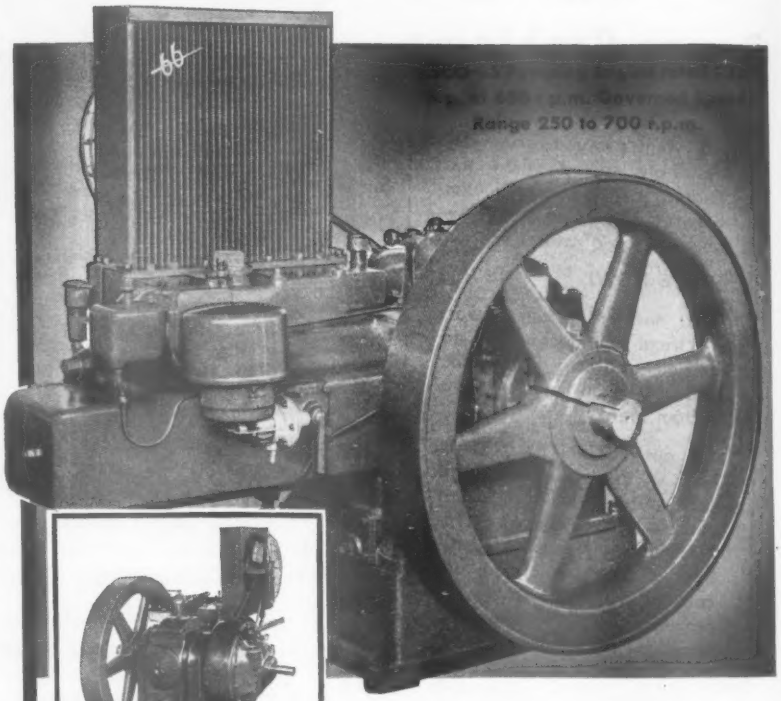

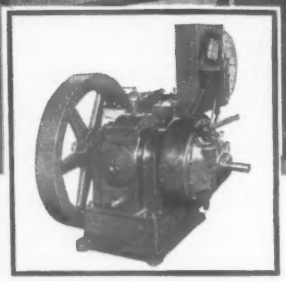

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Exploration and Drilling

Week's Highlights

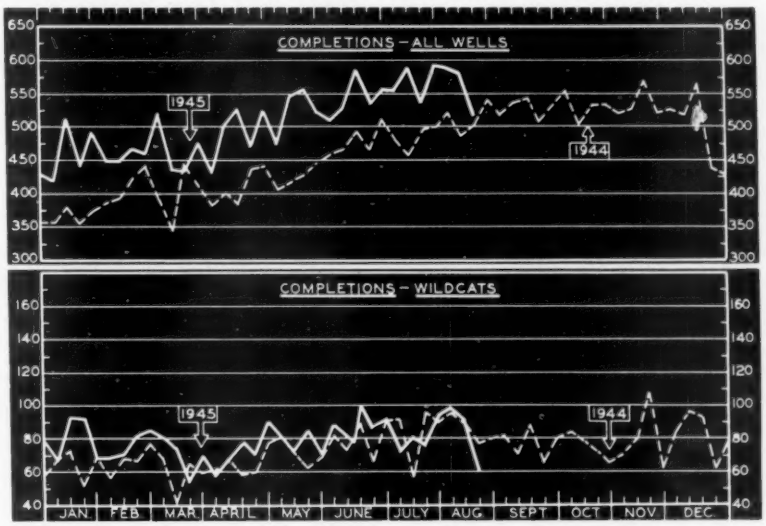
WHAT will be the immediate effect of V-J Day on the current exploration program of the industry, now running at the highest levels in history?

For the moment, current opinion seems to be that there will be little or no change during remainder of 1945. The major factor in this concensus is that fourth quarter activities are practically all on a firm commitment basis already, and must be carried out.

Larger companies have always operated on a budget basis, which in general breaks down into quarters. Although there is a certain amount of flexibility in the drilling budget as a whole, permitting substitutions here and there as new developments cause changes in local situations, this flexibility applies mainly to development wells.

With a large company, wildcatting is part of the long-range planning of the geological department. In such planning a balance is always sought among large blocks of cheap acreage with long term prospects; intermediate acreage of greater promise, a certain percentage of which is apt to become "hot" at any time; and acreage which currently has a high market value, regardless of its acquisition cost, because of activity or prospective activity by many companies in the same area.

As a result, when the annual budget is prepared the amount of wildcat testing is almost predetermined by the acreage holdings at that time, lease expiration dates, and by activity by other companies in certain areas.



Solid line charts current weekly completions, service wells in Eastern area included

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 18, 1945

	Total of all wells							Wildcat completions and discoveries									
						Cum. to date							Cumulative total, 1945				
	Comp.	Oil	Gas	Dry	Footage	1945	1944	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	34	17	0	*17	40,115	891	1,012	0	0	0	0	0	0	0	0	0	0
Pennsylvania	85	44	4	†37	136,612	2,567	2,516	0	0	0	0	0	0	0	0	0	0
West Virginia	8	1	7	0	29,299	502	554	0	0	0	0	0	0	0	0	0	0
Ohio	20	8	10	2	51,000	578	603	0	0	0	0	0	0	0	11	41	52
Indiana	2	0	0	2	4,197	121	140	0	0	0	0	0	5	0	0	18	23
Kentucky	13	6	3	4	24,748	315	433	0	0	0	1	1	17	0	2	31	50
Illinois	36	20	0	16	101,936	1,088	1,152	1	0	0	2	3	28	0	0	191	219
Michigan	5	2	0	3	12,670	471	393	0	0	0	0	0	6	0	3	161	170
Kansas	30	13	4	13	99,898	1,049	1,111	0	0	1	7	8	22	0	11	221	254
Neb., Mo., Iowa	0	0	0	0	0	13	21	0	0	0	0	0	0	0	0	9	9
Oklahoma	47	22	3	22	196,237	1,516	1,064	0	0	1	6	7	54	2	12	224	292
Texas	134	73	12	49	583,706	4,528	3,392	2	0	1	23	26	138	12	37	817	1,004
North Central	46	25	0	‡21	102,249	1,363	901	0	0	0	8	8	54	0	5	290	349
West	27	19	0	8	131,361	1,154	942	0	0	0	4	4	37	1	0	174	212
Panhandle	10	2	8	0	33,457	357	142	0	0	0	0	0	0	0	1	5	6
Eastern	3	2	0	1	24,254	201	206	0	0	0	0	0	5	6	1	52	64
Gulf Coast	34	19	3	12	227,367	1,026	745	1	0	1	8	10	29	4	24	177	234
Southwest	14	6	1	7	65,018	427	456	1	0	0	3	4	13	1	6	119	139
Louisiana	21	11	3	7	155,528	642	492	1	0	0	1	2	22	3	4	81	110
Northern	8	3	2	3	20,072	236	187	0	0	0	1	1	6	1	4	47	58
Southern	13	8	1	4	135,456	406	305	1	0	0	0	1	16	2	0	34	52
Arkansas	3	3	0	0	24,021	110	141	0	0	0	0	0	0	0	0	28	28
Mississippi	11	7	0	4	74,968	229	84	0	0	0	2	2	3	0	0	73	76
Southeastern	1	0	0	1	3,450	39	23	0	0	0	1	1	0	0	1	26	27
Montana	5	1	0	4	11,944	194	203	0	0	0	2	2	7	0	0	16	23
Wyoming	2	1	0	1	8,235	126	103	0	0	0	1	1	10	0	0	24	34
Colorado	0	0	0	0	0	22	20	0	0	0	0	0	1	0	1	3	5
New Mexico	7	2	0	5	22,215	277	242	0	0	0	0	0	8	0	4	36	48
California	50	36	2	12	177,795	1,488	1,243	0	0	0	7	7	2	0	2	149	153
Total United States	514	267	48	199	1,758,574	16,766	14,942	4	0	3	53	60	323	17	88	2,149	2,577
Total previous week	578	326	42	210	1,922,624	16,252	18,150	6	0	2	80	88	319	17	85	2,096	2,517
Total Aug. 19, 1944	495	259	45	191	1,650,480	14,942	10,675	9	0	3	65	77	264	20	79	2,008	2,371

Service wells included: *17, †35, ‡3.

With smaller companies, the long-range budget during peacetime was not as rigidly fixed early in the year, but war brought conditions that put them in pretty much the same position as the large companies. Difficulties in securing prompt delivery of materials, in arranging for drilling rigs, and in compensating for labor shortages combined to force more advance scheduling of wildcat commitments.

Tax problems also enter the picture, with smaller companies taking the attitude that the excess profits tax on oil being sold below replacement cost compels them to take more long wildcat shots to maintain their relative competitive position in proven crude reserves.

EASTERN TEXAS

Travis Peak Wildcat Location Made in Camp

DALLAS.—B. F. Phillips and A. O. Phillips of Gladewater, Tex., have staked an 8,500-ft. Travis Peak wildcat in Camp County. It is 1 C. A. Dobson, 467 ft. from the north line and 1,550 ft. from the west line of D. C. Lucas Survey. The wildcat is 5 miles southeast of Leesburg and 4 miles southeast of the Pittsburg pool.

Lone Star Production Co. 1 Tandy, W. Martin Survey, 12 miles north and slightly east of Centerville, wildcat in the Buffalo Woodbine area of Leon County, was drilling below 10,767 ft. in hard sand.

Humble Oil & Refining Co. 1 Maness, J. M. Musquez Survey, wildcat 8 miles southeast of Rusk in Cherokee County, is testing at total depth of 9,289 ft.

The Pickton field, Hopkins County, had two completions. The Carthage field, Panola County, had eight new locations, and the Jefferson field, Marion County, had two.

KANSAS

Five Counties Have Promising Wildcats

FIVE counties in Kansas are highlighted this week with possible pool openers. In Ness County, the Chalmette Petroleum Co. 1 Bowman, NW NW NE 31-19-25w, about 8 miles south of the Aldrich pool, is swabbing 25 bbl. of oil per hour from the Mississippi lime, about 1,500 ft. off bottom. The drill-stem test, taken at 4,553-80 ft., open 30 minutes, recovered 600 ft. oil-cut mud, and 800 ft. free oil. Lansing was topped at 3,933 ft., and Mississippi lime at 4,551 ft.

Decatur County.—Operators are continuing to test at the Continental Oil Co. 1 Brown, NE NE NE 33-3-27w, a rank wildcat test approximately 14 miles north of the Allen pool of Sheridan County. The well yielded 7 bbl. per hour on the swab, with production coming from the Lansing at 3,610-22 ft. The hole has been perforated and treated with acid.

Pawnee County.—J. M. Huber Corp. and Kiowa Drilling Co. 1 Katchelman, NW NW SW 34-22-16w, swabbed 3½ bbl. of oil per hour from the Arbuckle after acid. Pipe was set at 4,059 ft., at the top of the Arbuckle. Operators are building tank battery for further testing.

Phillips County.—Stanolind Oil & Gas Co. 1 Wiltrout, SW SW SW 35-4-20w, recovered 200 ft. oil-cut mud on a 1-hour drill-stem test taken with the packer set at 3,372 ft. Lansing was cut at 3,086 ft. and Arbuckle at 3,384 ft.

Sedgwick County.—British-American Oil Co. 2 Petrie, NW SW SW 36-26-1w, 2 miles west of Wichita city limits, had a 2,100-ft. fillup, probably from the Viola. This test offsets a dry hole drilled by British-American in December 1944.

KANSAS SUCCESSFUL WILDCAT

Finney County: New gas pool—Atlantic 1 Wright, SE NW NW 33-21-34w, 9,000,000 cu. ft. gas from Herrington and Krider at 2,537-62 ft. and 2,600-18 ft., TD 4,915 ft., Herrington 2,524 ft., Krider 2,605 ft., Winfield 2,669 ft., Fort Riley 2,730 ft., Kansas City 3,832 ft., Cherokee 4,535 ft., Mississippi lime 4,703 ft.

KANSAS WILDCAT FAILURES

Barton County: Lion 1 Hammeke, SW NW 13-19-12w, dry, TD 3,450 ft., Arbuckle 3,376 ft.

Ellis County: Derby Oil 1 Schumacher, NW NW NW 1-15-17w, dry, TD 3,530 ft., Arbuckle 3,495 ft.

Rice County: Ed Swearer et al 1 Blake, SE SE NE 6-18-6w, dry, TD 3,685 ft., Maquoketa 3,679 ft.

Rooks County: Eldorado and Ed Swearer 1 Verveka, SW NW SE 29-8-19w, dry, TD 3,586 ft., Arbuckle 3,534 ft.

Rush County: Skelly 1 Scheuerman, NE NE SW 6-18-16w, dry, TD 3,523 ft., granite 3,521 ft.

Stafford County: Plains Exploration 1 Bowman, SW NW 17-23-11w, dry, TD 3,784 ft., Arbuckle 3,759 ft.

Trego County: Lauck & Moncrief 1 Musgrave, SW SW NE 31-11-21w, dry, TD 4,060 ft., Arbuckle 4,024 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—R. S. Tomer 1 Warner, fifth operation in the Morrill pool of Brown County, Kansas, NE SE NE 4-1s-15e, is dry. Hunton lime was topped at 2,650 ft. and elevation was 1,143 ft. This is the second dry hole in the pool. It was 1,320 ft. north and west of the discovery well. The pool has three producers.

Dan Short 1 Mrs. W. F. Rankin, SE SE SE of 9-65n-40w, Atchison County, Missouri, about 2 miles northwest of Tarkio, is dry at 1,384 ft. Elevation was 1,033 ft. Wilson 1 Tom Edwards, in SEC SW 17-46n-33w, Cass County, Missouri, is dry at 889 ft. Mississippi lime was topped at 885 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 18 crude oil	Distillate, allied products	August PAW quota all oils	Aug. 11 crude oil
Alabama	900	.....	500	950
Arkansas	79,950	5,400	85,400	79,900
California	935,450	60,900	1,012,900	943,250
Colorado	11,650	.....	12,000	13,000
Eastern	64,750	6,300	71,500	65,700
Florida	200	.....	.....	200
Illinois	203,700	12,000	212,000	203,800
Indiana	13,200	.....	13,000	13,200
Kansas	275,700	4,500	278,500	268,250
Kentucky	29,100	2,600	30,600	29,250
Louisiana	365,050	42,000	402,000	365,100
North Louisiana	69,350	.....	.....	69,400
South Louisiana	295,700	.....	.....	295,700
Michigan	47,000	800	47,800	50,100
Mississippi	55,050	.....	53,000	52,850
Montana	23,600	300	22,300	23,600
Nebraska	850	.....	1,000	850
New Mexico	103,500	6,800	111,800	103,550
Oklahoma	391,000	28,000	408,000	391,000
Texas	2,222,700	166,000	2,356,000	2,222,700
East Texas	380,900	.....	.....	380,900
East Central Texas	145,600	.....	.....	145,600
North Central Texas	152,850	.....	.....	152,850
Texas Panhandle	88,000	.....	.....	88,000
West Texas	526,650	.....	.....	526,650
Southwest Texas	361,100	.....	.....	361,100
Texas Gulf Coast	567,600	.....	.....	567,600
Wyoming	109,300	3,500	121,700	106,350
Total United States	4,932,650	399,100	5,240,000	4,933,600
Change from previous week	down 950			

Total production January 1-August 18, 1945 ..... 1,109,531,725 bbl.
Same period last year ..... 1,036,064,150 bbl.

SOUTHWEST TEXAS

Discovery Completed In Live Oak County

CORPUS CHRISTI.—A new oil field in Live Oak County has been opened by Wright & Christi 1 Mrs. M. A. Hinnant, 19 miles southeast of George West, in Ed Quinn Survey, Abstract 388, which flowed 78 bbl. on a 24-hour potential test through a 7/64-in. choke, no water. Tubing pressure is 1,100 lb., casing pressure 1,950 lb., gravity not reported, gas-oil ratio 1,320 to 1. Production is from perforations at 5,772-80 ft. Total depth is 6,518 ft. with 5-in. casing set at 6,500 ft. The field takes its name from the discovery well and will be known as the Hinnant field.

A new oil field is being opened in Goliad County by W. C. McBride, Inc. 1 August Kenne, a wildcat 6 miles west of Weesatche, in J. W. Bergen Survey, Abstract 66. Test is cleaning through perforations at 7,612-26 ft., making some oil and wash water. Total depth is 7,724 ft.

The South Texas Geological Society has announced the name "Santa Maria" has been given the field discovered by LaGloria Corp. 1 South Mercedes unit, Capisallo District Subdivision, 3 miles south of Mercedes, in Hidalgo County.

There were 24 new locations reported this week, 12 being wildcats. Brooks, Duval and Karnes counties received two each, with Calhoun, Jim Hogg, McMullen, San Patricio, Victoria and Webb counties one each. Of the 30 completions 6 were wildcats, 1 new oil discovery in Live

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Oak County, and 5 dry wildcats. Duval County led with 6 completions.

SUCCESSFUL WILDCAT COMPLETED IN SOUTHWEST TEXAS

Live Oak County: Oil discovery, Hinnant field—Wright & Christie 1 Mrs. M. A. Hinnant, Ed Quinn Sur., Abst. 388; 19 miles southeast of George West, top sand 5,772 ft., TD 6,518 ft., perforations 5,772-80 ft., PT 78 bbl. per day through a 7/64-in. choke, gas-oil ratio 1,320 to 1, tubing pressure 1,100 lb., casing pressure 1,950 lb., no water.

WILDCAT FAILURES COMPLETED IN SOUTHWEST TEXAS

Brooks County: Sun Oil Co. 2-B Mary M. Lasater, in F. Benavides Sur. 329, 3 miles southeast of Falfurrias, dry at 1,060 ft. in salt.

Duval County: Argo Oil Corp. 1 Leroy Denman, Jose Marcelo Hinojosa Grant, Realitos Subdivision of Copita and and Garden Tracts, Lot 3, Block 14, 2½ miles east of Crestonia, dry at 5,200 ft.

Karnes County: Gulf Oil Co. et al 1 A. J. Kildozie, Falls City area, Louis Manchaca Grant, dry at 6,075 ft.

Karnes County: Seaboard Oil Co. of Delaware 1 E. N. Hysaw, in Don Erasmo Seguin Sur., Abst. 10; 7 miles west of Karnes City, junked at 4,088 ft. Moved 50 ft. south for 1-A well.

McMullen County: Quintana Petroleum Corp. 8-F South Texas Syndicate, Mary Lane Sur. 5, Abst. 534; 5 miles south of Fowlerton, dry at 5,868 ft.

SOUTH LOUISIANA

New Field Discovered in St. Mary Parish by Humble

NEW ORLEANS.—A new oil field, Bayou Carlin, has been opened by Humble Oil & Refining Co. 1-H Miami Corp. in St. Mary Parish, T-16s-8e. Drilled to a total depth of 11,919 ft., the well is producing 264 bbl. of 34.8-gravity oil per day through a 9/64-in. choke, from 70 perforations at 11,600-11 ft. Gas-oil ratio 347 to 1, tubing pressure 1,450 lb., no water. Humble has made a new location for 1 Warren Kearney et al.

In the South St. Gabriel area of Iberville Parish, Noble & Baker 1 W. E. Caldwell ran a new test in 30 perforations at 9,194-201 ft. but again the well showed salt water. Perforations were squeezed and it is waiting on cement to set. This well had produced from perforations at 9,191-211 ft. several days ago but started showing water and operators are now trying to get a shutoff.

Houston Oil Co. of Texas 1 Houston-fee, 28-6s-12w, at Fields, Beauregard Parish, is preparing to run a drill-stem test with total depth 7,635 ft. Cores from 7,617-35 ft. had recovered shale with some sand carrying gas odor.

There were 11 new locations reported this week—all field wells, no wildcats. Acadia Parish led with three locations. St. Martin and St. Mary parishes each had two locations. Of the 13 completions 1 was a wildcat discovery, being in St. Mary Parish. St. Martin Parish led with three completions.

SUCCESSFUL WILDCAT COMPLETED IN SOUTH LOUISIANA

St. Mary Parish: Oil discovery, Bayou Carlin field—Humble Oil & Refining Co. 1-H Miami Corp., T-16s-8e, total depth 11,919 ft., perforated with 70 holes from 11,600-11 ft., PT 264 bbl. day through 9/64-in. choke, gas-oil ratio 347 to 1, tubing pressure 1,450 lb., gravity 34.8° A.P.I.

PERMIAN BASIN

Crane Wildcat Showing Discovery Possibilities

MIDLAND.—Magnolia Petroleum Co. 1-B H. Tucker, Section 25, Block 1, H&TC Survey, southwestern Crane County wildcat, is a prospective discovery from the Waddell section of the Simpson. The nearest Waddell production is 3½ miles to the south in the Abell field of northern Pecos County. The last 3 minutes of a 46-minute drill-stem test from 5,774-5,801 ft., the test flowed clean oil through the drill pipe. Gas came to the surface in 5 minutes, drilling mud in 40 minutes, and oil in 43 minutes. Oil flowed at the rate of 10 bbl. per hour. Hole was cored from 5,801-07 ft. and 5,807-17 ft., but no shows were recovered. Five and one-half inch casing has been cemented at total depth of 5,817 ft.

Gulf Oil Corp. 2-E Henderson, Section 25, Block B-27, PSL, discovery from the Tubb horizon in southwestern Crane, 2⅞ miles northwest of the Sandhills district, flowed 66.24 bbl. of 34.2-gravity oil in 3 hours after treatment with 1,000 gal. of acid from 4,380-4,445 ft., total depth. The well is shut in for official test. Atlantic Refining Co. 1-A University, Section 33, Block 31, University Land, Devonian discovery in eastern Crane, 6 miles west of the north end of the McElroy pool, was drilling below 9,620 ft. in lime. The test is being carried to the Ellenburger.

Magnolia and Humble Oil & Refining Co. 1 Cowden, Section 7, Block A-55, PSL, Devonian discovery in the southwesterr corner of Andrews County, flowed 169 bbl. of oil in 6 hours on a drill-stem test after treatment with 1,000 gal. of acid through perforations from 7,900-20 ft. and

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7,920-40 ft. Humble 88-X Means, Section 9, Block A-35, PSL, deep test in the Means pool, was drilling below 12,972 ft. in lime.

Ellenburger production in the Todd deep field of western Crockett County has been extended ¼ mile north by Francis A. Callery et al 4 Shannon, Section 27, Block WX, GC&SF Survey. It flowed 1,439 bbl. of 41.8-gravity oil in 24 hours from 6,150-6,270 ft.

Humble 1 Mrs. O. P. Buchanan, Section 32, Wm. Baldridge Survey, Midland County wildcat 9 miles southeast of Midland, after perforating with 397 shots from 12,130-230 ft. in the Ellenburger, swabbed down to 6,950 ft. from the surface with no shows reported. Ellenburger was topped at 12,163 ft. It was still testing.

Each of the following fields reported two completions this week: Fullerton, Andrews County; TXL, Ector County; Keystone-Ellenburger, Winkler County; and Ownby, Yoakum County. The Slaughter field, Cochran County, led in new locations with 10, while the Fullerton field had four.

WEST TEXAS WILDCAT FAILURES

Andrews County: DeKalb Agri. Assn. 1-C Lockhart & Brown, Sec. 12, Blk. A-41, PSL Sur., 3 mi. W Fuhrman-Mascho pool, elev. 3,286 ft., Grayburg 4,180 ft., dry, TD 7,254 ft.

Concho County: Mrs. Mae Belcher 1-A Will Lovelace, Sec. 10, L. M. Higginson Sur., 2½ mi. S and 1 mi. W Wellview, elev. 2,004 ft., dry, TD 3,290 ft.

Sterling County: Sunray Oil 1 J. L. Glass, Sec. 31, Blk. 22, H&TC Sur., 15 mi. SW Sterling City, elev. 2,511 ft., Clear-Fork 2,615 ft., dry, TD 2,875 ft.

Yoakum County: Dunagan Bros. & Brahany 1 Watson, Sec. 422, Blk. D, Jno. H. Gibson Sur., 4 mi. W Plains, elev. 3,707 ft., San Andrews 4,515 ft., dry, TD 5,505 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Richfield Oil Corp. has staked 1 Federal-Lillian Cole, a proposed 7,500-ft. wildcat in east central Chaves County. The test is in 11-11s-37e, 4 miles east of the Comanche field and 17 miles west and slightly north of Roswell. Drilling will begin at once. Van S. Welch will drill a 3,500-ft. wildcat in western Lea County about 2 miles south of the Salt Lake pool. It is 1 State, 31-20s-33e.

Neville G. Penrose, Inc. 1 Federal-fee, 9-22s-37e, Ellenburger discovery in the Penrose field of southeastern Lea County, is testing the zone from 8,120-40 ft. It previously flowed oil at the rate of 15 bbl. hourly on a drill-stem test from 7,946-92 ft. Ellenburger was topped at 6,950 ft. with elevation of 3,429 ft. Total depth is 8,370 ft.

Eddy County had four field completions this week, while Lea County had two. Lea reported four new field locations and Eddy County two.

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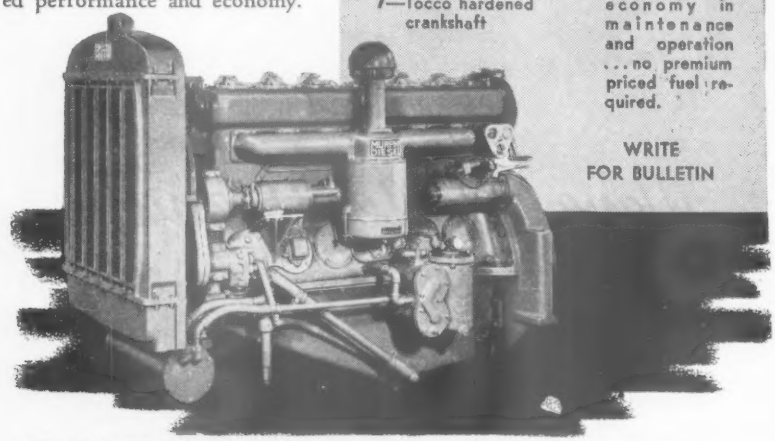

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ROCKY MOUNTAIN

Second Sand Draw Tensleep Well Is Good

DENVER.—Good well at Sand Draw.—Sinclair-Wyoming Oil Co. 2 Unit, SW SW SW 11-32n-95w, the second well drilled to the Tensleep following a discovery in 1 Unit, is a near completion and looks as though it will equal the discovery. It is a north offset to 1 Unit, which made around 1,000 bbl. initial under choke and subsequently produced 1,300 bbl. in 16 hours in a test through open casing. The second well had the top of the Tensleep at 7,897 ft. and in a drill-stem test at 7,887-7,894 ft. recovered 1,100 ft. of oil-cut mud, 25 per cent oil, and 5,075 ft. of oil. The 7-in. was set at 7,924 ft. and well is being completed.

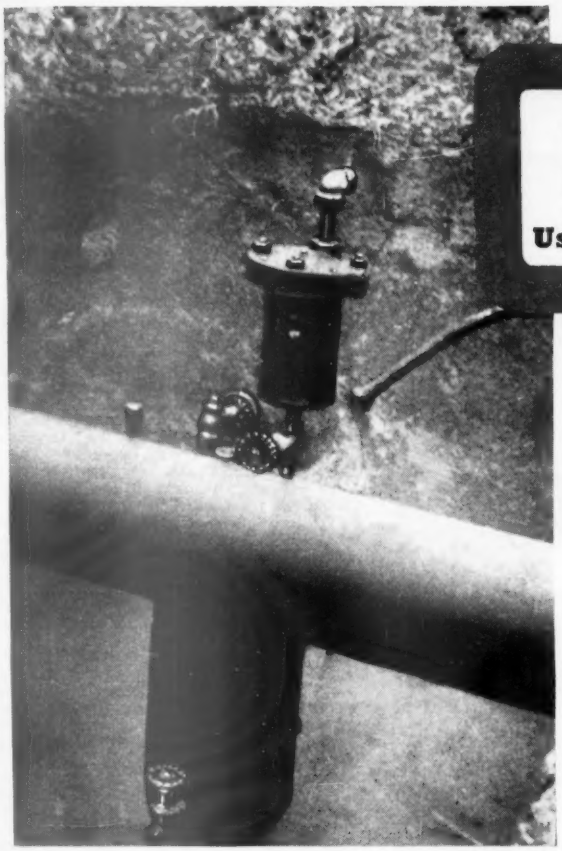
The surrender of Japan caused repercussions in the Rocky Mountain oil fields common to those throughout the world. Rigs were shut down, workers flocked to nearby towns and cities to celebrate, offices of oil companies were closed and news of field operations was reduced almost to the vanishing point.

East May Valley.—Union Oil Co. of California 1 Kroell, SE NW NW 27-21s-46w, East May Valley, Prowers County, Colorado, has reached old bottom after redrilling past stuck casing and is making new hole at 4,760 ft. in the Cherokee shale. It is through the Fort Scott lime but encountered no important results. While cleaning out above the Kansas City lime, topped at 3,618 ft., approximately 5,000 gals. of oil was spotted, but a drill-stem test in that horizon showed salt water.

Show at Little Medicine Bow.—British-American Oil Producing Co. 1 Union Pacific, SE SW SE 23-21n-78w, a wildcat 6 miles east of the Big Medicine Bow oil and gas field, Carbon County, Wyoming, made a drill-stem test at 6,344-58 ft., open one hour. A blow of gas was expended in about 32 minutes. Casing then was run and the 14-ft. horizon was tested through perforations. With tester open 30 minutes it recovered 34.6 ft. of oil and 60 ft. of mud, and is drilling ahead at 6,446 ft. This is a Sundance sand test.

Sulfur water in Reagan test.—Union Oil Co. of California 4 Tribal-194, NW SE SE 27-37n-7w, Reagan Structure, Glacier County, Montana, set the 7-in. at 4,078 ft., perforated with 20 holes at 3,866-76 ft., and recovered 700 ft. of sulfur water. Top of Colorado was at 1,280 ft.

More gas in Baxter Basin test.—Transcal Petroleum Corp. 1 Union Pacific, NE SE 11-19n-104w, a test to the Tensleep at North Baxter Basin, made a drill-stem test in the Nugget sand at 4,099 ft., total depth. Open 4 minutes, it flowed gas at the rate of 7,145,000 cu. ft. a day at the end of the test and was increasing. It



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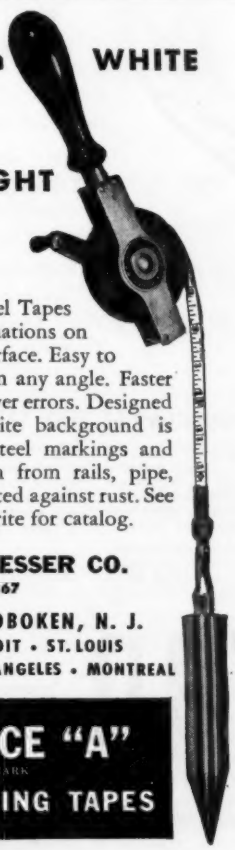

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previously had shown gas in the first and second Dakota sands and the Sundance.

New operations.—Fourteen new operations were reported for the week, of which 3 were wildcats. The wildcats are all in Wyoming. Development wells included 6 in Cut Bank, 2 in Rangely, and one each in Big Muddy, Grass Creek, and Gebo.

One of the wildcats is Texas Co. 1 Unit, SE NW NW 1-18n-98w, on the Table Rock structure, central part of eastern Sweetwater County, Wyoming, approximately 50 miles north of Powder Wash, which is producing oil and gas from the Wasatch formation, and 60 miles southeast of Lost Soldier, producing in several horizons down to and including the Tensleep. Kirk Oil Co. is drilling in the new South Elk Basin field in 1 Gill, Lot 3 Section 1-56n-100w, which will indicate the area of the new field. Wasatch Oil Refining Co. is moving in rotary for a test in 1 Cameron Unit, CWL SW SW 13-26n-89w, Bailey District, 2 miles east of the discovery well.

WYOMING WILDCAT FAILURE

Wagonhound, Hot Springs County: Broderick & Gordon 2 Christensen, NW SE SE 6-44n-98w, TD 4,568 ft., top Tensleep 4,500 ft., dry, location one-third mile south of discovery.

MONTANA WILDCAT FAILURES

Devon, Toole County: Frontier Refining 1 Christiana, NW NE NE 9-33n-1e, TD 1,648 ft., Sunburst 1,360-1,412 ft., top of Madison 1,631 ft., dry.

Harlo, Wheatland County: Mid-Montana Oil 1 Young, NW NE 13-7n-18e, TD 5,930 ft., dry.

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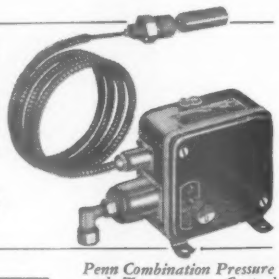

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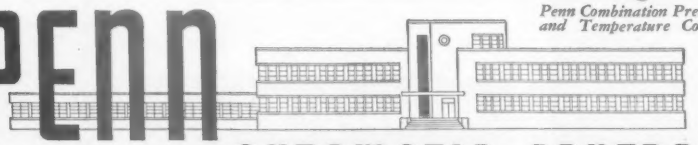

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CANADIAN FIELDS

Steveville-Princess Field Gains Fourth Well

CHATHAM.—In the Steveville-Princess field, east of Calgary, California-Standard 38-22-A, NE¼, LSD 15, 22-20-12w4, is being completed as the fourth producer from the Devonian limestone. The Devonian was hit at 3,968 ft., and operators set 7-in. production string at 3,943 ft., a drill-stem test with 3/16-in. choke indicating 150 bbl. with 680,000 cu. ft. gas and no free water. Location is ¾ mile east of the discovery well, with two other wells intervening, the three aggregating output of 265 bbl. from the Devonian. Drilling has gradually worked east of discovery, with the Devonian logging higher in each successive well. Empire Pacific 2, LSD 16, 22-19-12w4, is coring Devonian and two new California-Standard tests have been located.

Turner Valley.—In Turner Valley north extension, Foothills Oil & Gas 21, LSD 10, 4-21-3w5, finished with Madison limestone at 8,448 ft. acidized both porous horizons and started flowing at the rate of 1,440 bbl. a day with booster gas or 1,100 bbl. under its own power. Allotment close to 500 bbl. is expected.

Conrad.—In the Conrad field, southern Alberta, Conrad-Province 13-5-A, LSD 8, 5-6-15w4, total depth 2,962 ft., is making 50 bbl. on the pump. Conrad-Province 31-5-A, LSD 2, 5-6-15w4, is making about 40 bbl. Two other wells are testing and three are drilling.

Ram River.—On the Ram River-Clearwater structure in the northern foothills, Ram River Oils 3, LSD 12, 1-37-11w5, finished reaming to 5,642 ft. when swabbing showed a small quantity of oil from 60 ft. porosity in the Devonian. Drilling will be continued to the lower porous zone encountered in Ram River 2 before acidizing.

Stirling.—In the Stirling area, southern Alberta, Imperial-Stirling 1, LSD 4, 15-7-19w4, has been abandoned in Devonian limestone at 5,484 ft.

N. CENTRAL TEXAS

Childress County Test Disappointing

WICHITA FALLS.—The Texas Co. 1 F. & M. Trust, Section 644, Block H, W&NW Survey, Childress County wildcat 5 miles northwest of Childress, is dry after 30-minute drill-stem test from 7,580-7,618 ft. recovered 1,158 ft. of salt water. Bottom-hole pressure was 2,700 lb. Ellenburger was topped at 7,535 ft. Total depth is 6,618 ft.

Roser & Pendleton, Inc., and F. Kirk Johnson 1 McAnally, Lot 18, Block 2, Henderson County School Land, pool opener ½ mile northeast of Joplin, Jack County, has been completed for 126.83 bbl. of 41-gravity oil in 11 hours and 45 minutes through ¾-in. tubing choke. Gas-oil ratio was 1,914 to 1. Pay was topped at 4,430 ft. Total depth is 4,450 ft. Panhandle Producing & Refining Co. 4 Cherryhomes, R. S. Corder Survey, in the Cherryhomes pool of southeastern Jack, drilled conglomerate showing oil from 5,033-45 ft. On a 15-minute drill-stem test from 5,035-50 ft. recovery was 90 ft. of free oil and 100 ft. of heavily oil-cut drilling mud.

Fred Snuggs et al 1 Almon, J. M. Randolph Survey, wildcat 4 miles east of Gainesville, Cooke County, drilled sand showing oil from 2,360-66 ft. and 2,899-2,907 ft., total depth. Casing was

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cemented at 2,399 ft. When the plug was drilled, the hole filled with 800 ft. of oil in 7 hours. Operator was preparing to test.

Archer County had nine field completions this week, Wichita County had five and Clay County had four. Archer County also led in new field locations with seven, while Wichita County had six and Cooke and Young counties each had five.

In West Central Texas, Jones County had four field completions. Taylor County had five new locations and Coleman and Jones counties each had three.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: S. F. Hutcheson 1 J. M. Powell, Wm. Henry Sur. A-163, 1 mi. NE Archer City, dry, TD 1,367 ft.

Wayne King 2 W. S. Hale, Blk. 95, Harris subd. Club Ranch, 4 mi. W and ½ mi. S Archer City, dry, TD 1,454 ft.

Clay County: Staley 2 Jno. Schaffner, A. McGowan Sur. A-519, 3 mi. NW Petrolia, dry, TD 1,382 ft.

Cooke County: W. B. Catlett 1 J. R. Bezner, W. Martin Sur. A-692, ½ mi. S Lindsay, elev. 771 ft., Ellenburger 1,780 ft., dry, TD 1,832 ft.

S. D. Johnson 1 C. F. Bundy, P. P. Cady Sur. A-1239, 2½ mi. E and ½ mi. N Leo, dry, TD 2,174 ft.

Wichita County: Akin & Dimock 1 Hilda Lalk, Blk. 286, Waggoner Colony Lands, 2½ mi. N and 3½ mi. E Electra, elev. 1,133 ft., dry, TD 2,102 ft.

Bridwell Oil 1 J. S. Bridwell, Sec. 12, AB&M Sur. A-809, 5½ mi. N Fowlkes, dry, TD 1,659 ft.

Young County: Timberlake & Kelleher 1 N. & S. Prideaux, A. McMullen Sur. A-198, 2½ mi. E and 3½ mi. N Farmer, dry, TD 747 ft.

ILLINOIS

New Productive Spots In Clay and Wayne

CENTRALIA.—Twenty oil wells producing a combined initial of 2,615 bbl., and 16 dry holes, a total of 36 completions were reported in Illinois in the past week. The new oil wells ranged from 510 bbl. down to 5 bbl. in first-day output.

Texas Co. has opened a new producing spot in Wayne County with its 1 A. Bowyer, SE SE NW 34-1s-5e, which swabbed 228 bbl. in 24 hours and was awaiting pumping unit for further tests. It produces from Aux Vases sand at 2,974-81 ft. It is 3 miles from other production.

Kingwood Oil Co. completed a productive wildcat in 1 Alex Fulk, SW SE SW 13-5n-7e, Clay County, good for 58 bbl. of oil and 17 bbl. of water in 24 hours from Cypress sand.

The largest new producer of the week, Pure Oil Co. 1 T. H. King, SW NE SE 26-1n-8e, in the Clay City field in Wayne County, started at 510 bbl. from McClosky lime at 3,113-16 ft. Pure also completed a 390-bbl. well in C-1 T. R. Michels, 26-2n-7e, in the same field, producing from McClosky lime at 3,040-49 ft.

ILLINOIS SUCCESSFUL WILDCAT

Clay County: Kingwood 1 Fulk, SW SE SW 13-5n-7e, lower Cypress 2,563-75 ft., upper Cypress 2,527-37 ft., TD 2,577 ft. Shot at 2,532-34 ft., produced 58 bbl. of oil and 17 bbl. of water in 18 hours on pump.

ILLINOIS WILDCAT FAILURES

Fayette County: National Associated 1 E. C. Smith, NW NW SW 15-6n-3e, dry at 2,177 ft. McClosky lime penetrated.

Hamilton County: Ashland 1 Snyder, NE

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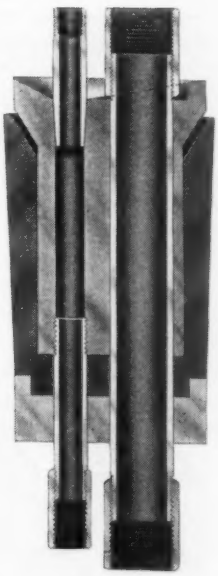

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APPALACHIAN FIELD

New Oriskany Gas Pool Gets Three New Gassers

PITTSBURGH.—Three new gas wells of exceptional volume were completed in the new Oriskany pools in Jackson and Kanawha counties, West Virginia, and one in the shallow Wyoming County field.

In Ravenswood district, Jackson County, Columbian Carbon Co. 798 T. W. Armstrong gaged 10,560,000 cu. ft. of gas after shot with a rock pressure of 1,820 lb. in 16 hours, Corniferous lime 4,687 ft., Oriskany sand 4,797 ft., gas 4,804-08 ft., total depth 4,808 ft. In Ripley district, United Carbon Co. 1,293 W. E. Hupp et al was good for 17,437,000 cu. ft. gas, natural. Corniferous lime 4,745 ft., Oriskany sand 4,854 ft., gas, 4,854 ft., total depth 4,871 ft.

In Elk district, Kanawha County, A. C. Radford et al No. 1 Geo. W. Harless tested 13,962,000 cu. ft. gas. Corniferous lime 5,187 ft., Oriskany sand 5,310 ft., gas 5,323 ft., total depth 5,323 ft.

Other wells being drilled in the closing stages in these districts and being watched with interest are United Fuel Gas Co. 5667 Helen Smith, Corniferous lime 4,634 ft., drilling at 4,645 ft.; United Carbon Co. 1268 R. A. Marshall, Corniferous lime 5,176 ft., drilling at 5,194 ft., and United Fuel Gas Co. 5595 fee, Corniferous lime 5,203 ft., running 7-in. casing at 5,218 ft.

In Center district, Wyoming County, Godfrey L. Cabot, Inc. 1168 Short Unit, gaged 6,981,000 cu. ft. gas with a rock pressure of 860 lb. in 20 hours in the Berea sand, total depth 3,516 ft.

Forty-four new locations, the greatest number in recent months, were reported in West Virginia; one each in Barbour, Brooke, Gilmer, Lewis, Marshall, Mingo, Monongalia and Upshur counties; two each in Braxton, Clay, Logan, Nicholas and Pleasants counties; three each in Hancock, Kanawha, Putnam and Roane counties; four each in Calhoun and Lincoln counties and six in Ritchie County.

In Robinson Township, Washington County, Pennsylvania, The Texas Co. deep test on the J. P. Walker farm was completed at 6,244 ft. Salt water in the Oriskany sand and will be abandoned without further drilling. Eight new regular drilling operations were reported in Pennsylvania—one in Clarion County, four in Greene County, one in Jefferson County and two in Washington County.

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TEXAS GULF COAST

North Flank of Boling Dome Yields New Production

HOUSTON.—New oil production on the north flank of the old Boling dome in Wharton County has been opened by Union Oil Co. of California. This new producer is 1 estate of E. Hawes and Lizzie M. R. Hawes, in John Huff League, Abstract 31, about 1 mile from Lago. With total depth 4,690 ft., 5½-in. pipe was set to 4,645 ft., and perforations were made at 4,550-70 ft. Details of the completion not yet available but it is credited with having cleaned as a good producer and is now shut in for storage.

British-American Oil Producing Co. 2 Hurta et al, in Robert Hodge Survey, Abstract 33, at Needville field in Fort Bend County, ran drill-stem test at 5,912-19 ft., using ¼-in. chokes and recovered gas, mud and oil in sufficient quantity to assure oil production at this level. It is drilling ahead at 6,464 ft. in shale.

Glenn H. McCarthy 1 Hudgins, a wildcat about 4.2 miles northeast of Velasco in southern Brazoria County, was abandoned at total depth of 7,520 ft. No shows of importance were found in drilling to this depth.

There were 14 new locations reported this week, 1 a wildcat in Jefferson County. Wharton County led with three locations. Of the 18 completions this week, 1 was a new sand in Matagorda County, 1 a gas discovery in Wharton County, and 5 dry wildcats, 1 each in Brazoria, Chambers, Fayette, Harris, and Orange counties.

WILDCAT FAILURES COMPLETED IN UPPER GULF COAST TEXAS

Brazoria County: Glen H. McCarthy 1 S. W. Hudgins, B. T. Archer Sur., Abst. 9, 4.2 miles northeast of Velasco, dry at 7,520 ft.

Chambers County: E. R. Brann et al R. J. Barrow, Jno. S. Roberts Sur., Abst. 21, 10 miles south of Anahuac, dry at 8,951 ft.

Fayette County: Clark & Cowden Drilling Corp. 1 Louise Paulus et al, T. H. Harris Sur., Abst. 208; 6 miles northwest of Flatonia, dry at 2,514 ft.

Harris County: Homer W. Snowden 1 Lobit & Wilson, D. Middleton Sur., Abst. 535, 2½ miles northwest of Addicks, dry at 8,007 ft.

Orange County: Atlantic Refining Co. 1-D Lutcher-Moore Lumber Co., T&NO

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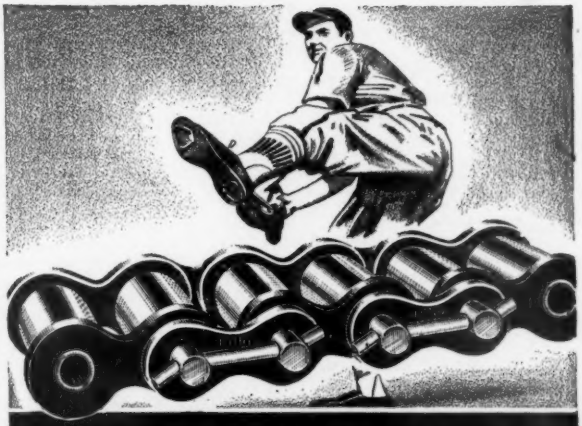

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SUCCESSFUL WILDCATS COMPLETED IN UPPER GULF COAST TEXAS

Matagorda County: New oil sand—East Bay City field—Stanolind Oil & Gas Co. 1 Elizabeth Lukefohr Barth, M. O'Connel and I&GN Survey, top sand 10,424 ft., TD 10,493 ft., perforated with 24 holes at 10,424-28 ft., PT 40 bbl. per day through 7/64-in. choke, gas-oil ratio 6,975 to 1, tubing pressure 3,400 lb., gravity 30.5° A.P.I.

Wharton County: Gas discovery—Texo-well Service & Machine Co. 1-A Sam Hamberger, WCRR Survey, Abst. 371, Sec. 65, 4 miles south of Glen Flora, TD 4,511 ft., perforations 4,448-58 ft., PT 750,000 cu. ft. of gas per day through ⅛-in. choke, tubing pressure 1,500 lb., casing pressure 1,800 lb.

CALIFORNIA

California Wildcatting Expected to Increase

LOS ANGELES.—The effect of V-J Day on drilling operations in California is problematical but the outlook is for a reduction in development work and an increase in wildcat exploration. Production will probably be severely reduced if not entirely eliminated at Elk Hills but even in the face of this the Navy Department could proceed with the projected exploratory program in the Hillcrest or west end of the reserve. The Navy Department now controls all acreage within Naval Petroleum Reserve No. 1, having acquired all holdings of Union Oil Co., Richfield Oil Corp. and B. & M. Oil Co. A suspension by Navy would force Standard Oil Co. of California to shut in its Elk Hills production, causing a reduction of approximately 65,000 bbl. daily in the state's output.

The Texas Co. appears to hold most of the potentially productive acreage around Western Gulf Oil Co.'s discovery well in the Santiago district and has started preliminary work in the area. Texas Co. acquired title only a short time ago to all property held for a number of years by Western Minerals and along with other leases owns 180 acres in Section 21 and 320 acres in Section 16 adjoining land on which the discovery well was completed. Gulf's well is flowing 350 bbl. daily through a 17/64-in. choke from 2,678 ft.

Developments in the Ramona field during the week included completion of Bankline Oil Co. 105 Orduno in 18-4n-17w to extend the field to the southeast. The Texas Co. abandoned its outpost about ½ mile west of production after going to 7,108 ft. Texas has, however, completed 32-18 Kern in 18-4n-17w, and in the meantime drilled ahead in 41-18 Kern to 7,610 ft. The latter well is being plugged back to the upper sand after failing to encounter a lower productive horizon and should make a normal producer. Developments indicate that the Ramona field will be rather limited in extent and of secondary importance from a production standpoint.

In the Cymric district of Kern County, Union found the Carneros barren in 55-26 Anderson, in 26-29s-21e, and the hole is being plugged back for completion in the Anderson sand. Standard completed one well in the upper sand at Cymric but is taking a second down in search of the Anderson sand and has a third test about ready to start.

General Petroleum Corp. extended production in the Lanare field about ½ mile by completing 75-23 Witten in 23-17s-18e, but suspects the existence of an intervening fault.

Union extended the South Coles Levee field by completing 34-12 Kernco flowing 464 bbl. of 31-gravity oil and 650,000 cu. ft. of gas daily through a 48/64-in. bean. This well is east of production and will be brought into the unit plan of South Coles Levee after producing for a period of 30 days.

Locations announced during the week were slightly lower than wells completed. The list this week includes two new tests for gas and three to be drilled in wildcat territory. Only seven locations were announced for Los Angeles Basin fields as compared with 24 for the San Joaquin Valley and 10 for the Coastal district.

CALIFORNIA WILDCAT FAILURES

Imperial County, Holtville: Texas 1 Grupe-Engebretson, 8-16s-16e, bottomed in hard sand, only minor showings of gas, TD 12,313 ft.

Kern County, Mount Poso: J. H. and A. C. Fisher 2 Jean, 15-26s-28e, bottomed in basement schist, Vedder sand of Miocene age 830 ft. barren, top schist 1,050 ft., TD 1,098 ft.

Round Mountain: Independent Exploration 2 Heisen, 36-27s-28e, bottomed in gray sand, Vedder sand Miocene age was barren at 1,133 ft., TD 1,148 ft.

Tejon: Richfield 25-7 Tejon A, 7-10n-19w, bottomed in gray Santa Margarita sand, no showings of importance, TD 3,552 ft.

Los Angeles County, Pico: Rothschild Oil Co. 1 Broderick, 7-2s-11w, bottomed in soft sand, marker found at 1,560 ft., no showings of oil or gas, ran electric log, TD 2,000 ft.

Tulare County, Pixley: Jergins Oil Co. 18-17 Cal.-Grape, 17-32s-26e, bottomed in basement schist, Pyramid Hills sand 3,906 ft., Vedder sand 4,110 ft., Famosa sand 4,510 ft., top schist 4,621 ft., TD 4,634 ft.

Ventura County, Ramona: Texas 42-13

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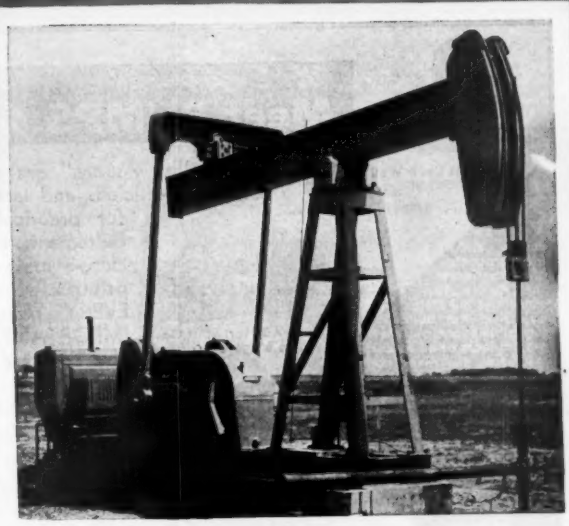

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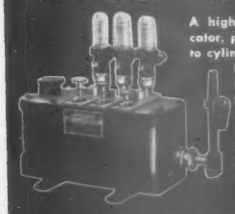

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LUBRICATOR DIVISION

Kern West, 13-4n-18w, bottomed in hard gray sand, low structurally, no showings of importance, TD 7,108 ft.

MISSISSIPPI

Fourth New Field This Year for Mississippi

JACKSON.—The state's fourth new field for 1945 has been opened by Humble Oil & Refining Co. 1 Smith, SE SE SE 12-9n-1e, in Jefferson County. The well flowed 217 bbl. of 37.4-gravity oil from the Basal sand through perforations at 9,730-36 ft. Tops were Wilcox 3,633 ft., Chimney Hill 7,877 ft., Austin 8,445 ft., base Austin 8,702 ft., first sand 8,870 ft., Marine Tuscaloosa 9,410 ft., Basal sand 9,675 ft.

Testing is continuing on the Carter Oil Co. 1 Alman, Alabama discovery in 5-10n-3w, Choctaw County. Perforations at 3,426-30 ft. which made salt water were successfully squeezed, and further tests have been made. A drill-stem test at 3,402-08 ft. recovered no fluid, and the well was then perforated at 3,344-53 ft., 3,360-77 ft., 3,379-87 ft., and 3,389-3,400 ft. Operators then swabbed at the rate of 56 bbl. oil and 16 bbl. salt water per day.

Mississippi completions this week totaled 11, including seven oil wells. Eucutta took the lead in field wells, with three oil wells and one dry hole. Only two wildcats, both dry, were completed. Eleven new locations have been announced, including four wildcat starts. Wildcat locations have been made in Hinds, Jones, Perry, and Stone counties. Alabama has one new location announced, a Gilbertown pool well to be drilled in SW SE NW 5-10n-3w.

MISSISSIPPI WILDCAT FAILURES

Scott County: Pan-American Producing 1 School Land, SE SE 16-5n-6e, dry, TD 7,447 ft., Comanche 7,335 ft.

Yazoo County: A. W. Hutchings Drilling 1 Montgomery, NE NE SE 34-11n-1w, dry, TD 7,604 ft., Massive sand 7,505 ft.

ALABAMA WILDCAT FAILURE

Walker County: Glen D. Rose Oil & Gas 1 Ulysees, N/2 NW SE 6-13s-6w, dry, TD 3,450 ft., Trenton 2,480 ft.

OKLAHOMA

McClain Co. Pool Opener Awaits Pipe Line

THE much discussed field opener, Cities Service Co. et al 1 Lawson, C SW NW 22-5n-4w, southwestern McClain County, Oklahoma, was shut in awaiting construction of a pipe line from the property to the Texas-Empire Pipe Line Co.'s trunk system. The well demonstrated an average production of 852 bbl. in 8 hours through ¾-in. choke with gas at the rate of 6,000,000 cu. ft. from Wilcox sand, with pipe perforated with 192 shots at 10,943-990 ft. It has been given a temporary allowable production of 300 bbl. of oil per day. Fred Lichtenheld, petroleum engineer for Cities Service, is quoted as saying the well could produce 1,000 bbl. a day without waste and the company will ask for an allowable of 500 bbl. per day.

Carter Oil Co.'s third deep test in McClain County will be 1 Thompson, C NE SE 36-8n-4w, work on which has begun. Carter 1 Mottinger, C NW NW 5-6n-3w was drilling at 7,618 ft. and its 1 Hawkins C NE NE 34-6n-3w, was drilling at 5,100 ft.

In the Antioch area in Garvin County, Cities Service Oil Co. will complete its discovery well, 1 Abernathy, SE SW SE 13-3n-2w, in the first Wilcox sand at 5,494-5,502 ft., total depth 5,667 ft., plugged back to 5,530 ft. It pumped from 200 to 250 bbl. per day when the first Wilcox sand was tested. Deeper drilling developed no increase.

In the Shawnee area in Pottawatomie County, The Texas Co. has given up on its 1 Lee, NE NE SW 8-10n-5e, a wildcat, at 4,784 ft. Wilcox sand at 4,771 ft. had only a showing of oil.

Ashland Oil & Refining Co. 1 Hales, NE NE NW 11-4n-7e, a wildcat in the Frances area in Pontotoc County, was given a drill-stem test in Gilcrease sand at 2,050-62 ft. and it showed 480 ft. of live oil, 90 ft. of oil-cut mud and no water in 60 minutes. Operators were preparing to complete the well.

Gulf Oil Corp. 1 Briscoe estate, 36-2n-8w, wildcat in northwestern Stephens County, was still in a debatable stage as to its potentialities. With a total depth of 8,104 ft. plug was drilled to 7,933 ft. and

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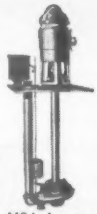

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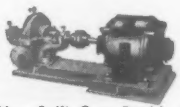
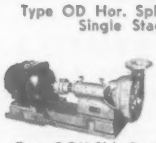


Type OD Hor. Split Case Double Suction Single Stage Centrifugal

APCO Horizontal Condensation Return Unit



Type GGU Side Suction Single Stage Centrifugal

APCO Single Stage Turbine-Type

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pipe perforated at 7,900-24 ft. It was swabbed down to 5,000 ft. and showed 580,000 cu. ft. of gas. After a short shut-in period, pipe was perforated at 7,732-34 ft. and the mud displaced by water. The well flowed 4 hours cleaning itself. Then it flowed 3 hours through 1-in. choke producing 20,000,000 cu. ft. of gas and 2½ bbl. of distillate per hour. It was again shut in. The pay is Pennsylvanian sand.

OKLAHOMA SUCCESSFUL WILDCAT

Hughes County: New gas pool—Deep Rock et al 2 Strickland, SW NE NE 19-7n-10e, flowed 4,000,000 cu. ft. of gas from Cromwell at 3,825-27 ft., TD 3,957 ft., Upper Viola 3,803 ft., Cromwell 3,823 ft.

OKLAHOMA WILDCAT FAILURES

Creek County: Creekmore-Rooney 1 Bailey, NE NE SW 26-14n-9e, dry, TD 3,705 ft., Wilcox 3,666 ft.

Logan County: J. E. Trigg 1 Wilson, NW SW SW 31-15n-2w, dry, TD 6,419 ft., second Wilcox 6,415 ft.

McClain County: Carter 1 Leflore, SW NE 31-8n-2w, dry, TD 8,219 ft., Bromide dense 8,115 ft.

Noble County: Charles Jenkins 1 Armstrong, SW NW 2-23n-2w, dry, TD 1,299 ft. in sand.

Seminole County: Mid-Continent 1 Patterson, SW NE SE 29-9n-7e, dry, TD 4,254 ft., Hunton 4,145 ft., Sylvan 4,220 ft.

Tillman County: Lincoln & Moore 1 Robbins, N/2 SW SW NW 8-1s-18w, dry, TD 4,715 ft., Arbuckle 3,970 ft.

OHIO, KENTUCKY

Black Fork Gas Field Spreads Into New County

COLUMBUS.—The Black Fork pool was extended last week into Jackson County by the Ohio Fuel Gas Co. 2 D. D. Edwards, Section 6, Madison Township. Clinton sand at 2,873-89 ft. gaged 657,000 cu. ft. with a rock pressure of 1,060 lb. Two additional locations will be staked.

The Wiser Oil Co. continues to find Oriskany gas in Bath Township, Summit County. Wiser 1 W. H. Tyson, Lot 43, found the sand at 2,070-2,114 ft. with a gage of 400,000 cu. ft.

Preston Oil Co. completed a good producer in Section 23, Ward Township, Hocking County, 255 Sunday Creek Coal Co. Clinton sand at 3,273-3,316 ft. made 80 bbl. in 24 hours.

Thirty-four new locations were reported with Stewart field having 14. Ashland-Lorain and Lancaster fields led in completions with five each.

EASTERN KENTUCKY

ASHLAND.—Elliott and Martin counties came in for most attention during the week with gas well completions totaling production of 809,000 cu. ft. and oil well with output listed at 13 bbl.

Inland Gas Corp. completed 268 J. H. Hammond on Bull Creek of Licking River in Magoffin County. at 1,649 ft. with daily open flow of 358,000 cu. ft. of gas from the Keener.

Kentucky-West Virginia Gas Co. completed 5612 R. C. Stafford, Marion County, at 453 ft. in Salt sand with daily open flow of 348,000 cu. ft. of gas.

Kentucky-West Virginia completed 787 Dan J. Syck, Pike County, at 3,672 ft. in shale with daily open flow of 103,000 cu. ft. of gas

Ware & Dietrich completed 5 Cassidy heirs, Wolfe Creek, Martin County, at 1,585 ft. with estimated daily oil production of 5 bbl.

Rocky Branch Syndicate completed 8 Kimbert Rucker, Elliott County, at 772 ft. with estimated daily oil production of 8 bbl.

Ashland Oil & Refining Co. completed 4 James H. Fraley, Elliott County, as dry at 976 ft.

WESTERN KENTUCKY

OWENSBORO, Ky.—In Crittenden County, 11 miles northeast of the town of Marion, Joe Riznik et al 1 M. L. Woodall, was being tested in Benoist sand at 1,387-1,400 ft., which had shown a production of 2 bbl. per hour while being cleaned out. It is 5 miles from production.

Carter Oil Co. completed a 250-bbl. well in 1 J. W. Whiteside, 25-P-21, Union County, in McClosky lime at 2,568-74 and 2,593-97 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Joe Reznik 1 W. P. Cooper, ½ mi. S of Smith Mills, dry at 2,742 ft. Upper Glen Dean 1,976 ft., Barlow 2,268 ft., Ste. Genevieve 2,542 ft.

INDIANA

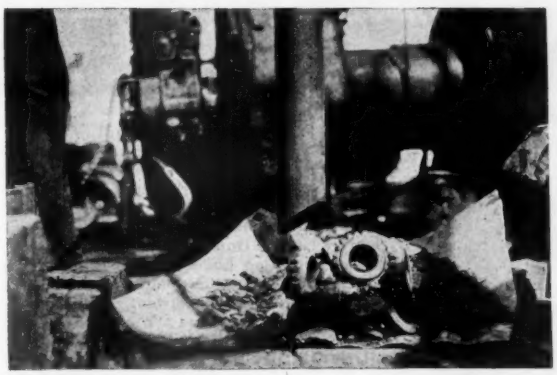
EVANSVILLE, Ind.—A dry hole each in Jackson and Knox counties were the sole completions reported during the week in Indiana. No wildcats were completed.

LA.-ARK.

Two New Producers Completed for Atlanta

MAGNOLIA.—Of the three completions reported for Arkansas this week, two were oilers in the Atlanta field of Columbia County. Tide Water Associated Oil Co.

CAVINS
HYDROSTATIC FISHING TOOLS



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2500	$1.68	$4.20	$8.40	$21.00

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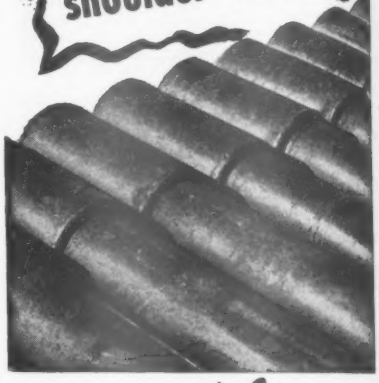

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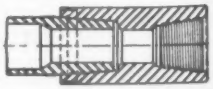
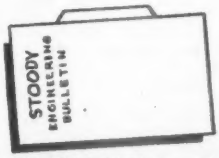
APPLICATION: Accepted method of application is to under-cut new or resleeved joints at the shoulder to form a recess ⅛" deep by 1½" wide. The recess is then filled by welding in with ⅜" Electric Tube Borium to form the wear resistant inlay.





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SUMMARY OF JULY COMPLETIONS*

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	137	69	100	0	†68	0	130	7	0	0	197,150	163
Pennsylvania	341	176	225	26	‡139	8	282	51	0	0	539,991	452
West Virginia	79	14	140	59	6	2	39	37	1	0	212,066	91
Ohio	82	23	425	32	27	11	24	44	3	0	219,039	183
Indiana	21	8	643	0	13	0	11	10	0	0	47,050	43
Kentucky	53	23	1,288	14	16	11	25	17	0	0	86,770	78
Illinois	197	105	15,130	0	92	9	43	145	0	0	523,035	211
Michigan	56	20	5,420	6	30	0	33	21	2	0	134,077	151
Kansas	146	75	24,965	15	§56	1	14	129	2	0	466,394	287
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	6
Oklahoma	185	106	24,951	16	¶63	14	41	80	50	0	694,828	491
Texas	571	306	71,935	69	196	40	113	202	207	9	2,490,751	1,169
North	143	73	7,987	4	66	37	55	30	21	0	368,420	163
West Central	42	17	6,980	1	24	0	17	23	2	0	113,009	83
West	132	99	39,459	3	30	2	22	59	48	1	612,698	383
Panhandle	47	18	1,868	28	1	0	0	47	0	0	150,391	148
Eastern	32	5	1,274	12	15	0	2	7	23	0	189,173	108
Upper Gulf Coast	58	26	5,378	5	27	0	2	10	40	6	404,051	106
Lower Gulf Coast	61	40	5,857	12	9	0	0	10	50	1	407,676	104
South	48	27	2,982	4	17	0	11	16	20	1	218,693	60
South Central	8	1	150	0	7	1	4	0	3	0	26,640	14
Louisiana	77	46	8,577	6	25	3	6	14	34	20	558,253	205
Northern	37	17	2,240	6	14	3	6	14	13	1	172,483	89
Southern	40	29	6,337	0	11	0	0	0	21	19	385,770	116
Arkansas	18	12	757	0	6	0	4	9	5	0	77,300	39
Mississippi	27	16	2,306	0	11	0	0	1	21	5	194,863	82
Ala., Ga., Florida	9	2	76	0	7	0	0	7	2	0	34,787	16
Montana	28	21	1,400	1	6	0	16	12	0	0	63,810	90
Wyoming	21	15	4,906	0	6	1	2	12	6	0	87,371	102
Colorado-Utah	5	4	1,188	1	0	0	0	0	5	0	30,953	40
New Mexico	28	19	5,642	1	8	4	5	12	7	0	95,071	110
California	231	173	38,168	5	53	9	49	114	49	10	1,005,443	264
Total July	2,312	1,233	208,242	251	828	113	837	924	394	44	7,759,002	4,273
Total June	2,588	1,350	257,237	261	977	100	996	947	486	59	8,844,573	4,249

*Four weeks ending July 28, 1945. Service wells included: †68, ‡128, §2, ¶3.

and Seaboard Oil Co. completed 2 Reeves, making 114 bbl. from pay at 8,289-91 ft., and 1 Spain, making 135 bbl. from pay at 8,310-12 ft. The other completion was Ashland Oil & Refining Co. 1 Bond unit No. 1, in the Village field. This well made 93 bbl. from 7,406-10 ft.

North Louisiana fields had eight completions this week, three oil wells, two gas wells, and three dry holes, one being a wildcat. Largest oiler completed was in the Delhi field of Richland Parish. Sohio Petroleum Co. 1 Robinson, 27-17n-9e, made 438 bbl. from a pay at 3,345-60 ft.

New locations for Arkansas this week number eight, including one wildcat to be drilled in Arkansas County. For North Louisiana, 10 new starts have been scheduled, including one wildcat each for Caddo and DeSoto parishes.

NORTH LOUISIANA WILDCAT FAILURE

Madison Parish: C. H. Murphy, Jr., and Sun 1 Mahoney, 660 ft. north and 2,023 ft. east of SW corner of 10-17n-11e, dry, TD 4,031 ft.

MICHIGAN

Gratiot County Test Logs Oil in Traverse

SAGINAW.—Gratiot County has promise of a new discovery well in the Arthur E. Williams 1 Cook, SW SE SW 14-9n-1w. The wildcat, located northeast of an old well that produced Traverse oil several years ago, topped Traverse lime at 2,434 ft., and pay was found at 2,436-38 ft. Casing was to be set in the 8-in. hole, but holidays in celebration of the end of the war delayed tests. Preliminary tests showed oil at about 1 bbl. per hour.

The forty-sixth commercial oil producer for the Coldwater field of Isabella County was completed this week by Sohio Petroleum Co. The well, 3 Cole, flowed 160 bbl. on a 3-hour test. Dundee was topped at 3,737 ft., and total depth was 3,749 ft.

Federal Leasing Act Hearings Scheduled

CASPER. — Senator O'Mahoney, along with the rest of the subcommittee investigating the petroleum resources and a portion of the Department of the Interior will be in Casper August 27 and 28 and in Denver August 30 and 31, for the purpose of holding public hearings regarding the proposed changes in the federal oil and gas leasing act of February 25, 1920.

The Wyoming and Montana operators will be heard at Casper, Wyoming, and the New Mexico, Colorado and Utah operators will be heard at Denver.

Crude Prices in Abell Pool Posted by Sinclair Prairie

Sinclair Prairie Oil Co., marketing division, has posted a crude-price schedule for the Abell (Ordivician) pool in Pecos County, Texas, as follows: Below 25°, 93 cents; 25-25.9°, 95 cents, with 2 cents added for each degree upward to 40° and over at $1.25. The prices are effective as of August 12.

LEGAL

CALL FOR BIDS to purchase royalty crude oil accruing to the United States from certain Federal oil and gas leases in Colorado and Wyoming. Pursuant to the provisions of section 36 of the Mineral Leasing Act of February 25, 1920 (41 Stat. 451; 30 U. S. C. 192), and in accordance with Departmental Order No. 2058, dated May 25, 1945 (10 F. R. 6502, 6926), sealed proposals, in duplicate, will be received in the Office of the Secretary of the Interior, Washington 25, D. C. on or before noon, August 27, 1945, from responsible bidders complying with the terms of Order No. 2058 for the sale and purchase, under contract, of all royalty crude oil (except royalty crude oil produced from the Lance Creek and Salt Creek fields which is now being disposed of by the United States, royalty crude oil produced from the Mancos Shale in the Rangely field, and royalty crude oil produced from the Tensleep formation in the Salt Creek field) accruing to the United States from Federal lands in the Wilson Creek, Iles, and Rangely oil and gas fields in Colorado, and in the Lance Creek, East Lance Creek, Little Buck Creek, Cole Creek, and Salt Creek oil and gas fields in Wyoming, for a term of 1 year commencing September 15, 1945, and ending September 14, 1946, with the right in either the United States, as seller, or the successful bidder or bidders, as purchaser, to terminate any agreement or agreements entered into pursuant to this call for bids and the specifications thereunder upon 60 days' notice in writing. The monthly royalty for April 1945 approximated 30,000 barrels of intermediate to paraffin base crude oils having gravities ranging from 32° to 52° A.P.I. Additional information with respect to the Federal oil and gas leases affected by this offering, analyses of the royalty crude oils involved, and information concerning the specifications governing the sale of the royalty crude oil produced from the fields identified above and the form of contract which the successful bidder or bidders will be required to execute, may be obtained from the Oil and Gas Supervisor, U. S. Geological Survey, 305 Federal Building, Casper, Wyoming. Sealed bids are to be submitted to the Secretary, Department of the Interior, Washington 25, D. C., pursuant to the specifications, the envelope to be marked plainly "Bid on United States royalty crude oil, Departmental Order No. 2058—Item , —not to be opened before noon, August 27, 1945." No bid will be considered if it is submitted after the date fixed herein, nor unless the showing required by Departmental Order No. 2058 has heretofore been made or is submitted simultaneously with the bid. Oscar L. Chapman, Assistant Secretary of the Interior.

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Among the Drilling Contractors

C. E. Mills, Lloydminster, has contract for a new well for Ponalta Syndicate in LSD 8, 12-49-1w4, in the Lloydminster field.

J. W. Spencer will drill on contract the J. F. Reed 1 Dowd, in NE NE SE 28-2s-16w, Van Buren County, Michigan.

Can-Tex Drilling Co., Calgary, has contract to drill Princess-C.P.R. 18-22-A, NE LSD 16, 22-20-12w4, for California-Standard in the Steveville-Princess field, eastern Alberta.

Nelson Drilling Co. has completed its wildcat test at 1 Allison, NE NW NE 23-19-6w, in northeastern Rice County, Kansas, as a dry hole. Test was located 6 miles east of Little River, Kans., and was drilled to total depth of 3,396 ft.

Hirschel G. Phillips is contractor on the Walter A. Elliott 1 Harold Fox, in SE NW SE 11-1s-15w, Van Buren County, Michigan.

Regent Drilling Co., Vermilion, has spudded Martin 1, LSD 2, 17-42-6w4, for Irwin Millner and associates of New York. The well is the first test to drill on the Vale Dome structure in eastern Alberta southwest of Wainwright Buffalo Park.

Don Ingling is the drilling contractor on the J. M. Huber Oil Co. 1 Stevenson, wildcat test in NE NE SE 14-20-2w, McPherson County, Kansas. The location has been staked and drilling had reached 2,250 ft. on the test, which is situated 1 mile southwest of production in the Ritz pool.

Robert W. Atha is contractor on two tests in Michigan. The first is the Gulf Refining Co. 1 Kawkawlin Township, in NE NW NW 1-14n-4e, Bay County, and the second is the Gulf Refining Co. 1 John Ponstine, in C N½ NE SE 25-21n-7w, Missaukee County.

I. W. Murfin is the drilling contractor on the Beech Aircraft Co. 1 Hinkle, in SW SE NW 6-27-2e, Sedgwick County, Kansas. The test is located approximately 4 miles east and 2½ miles north of downtown Wichita, and is about 4 miles north of production in the Eastborough pool and 7 miles southwest of Greenwich pool production.

Merrill Drilling Co. is drilling contractor on the J. E. Bauer 2 Lovel Post et al, in SE NW SE 15-19n-4e, Arenac County, Michigan.

Snyder & Head, Calgary, are preparing to resume drilling for Highwood-Sarcee Oils on Pekisko Hills 1, LSD 6, 6-17-2w5, from 4,485 ft. Location is on a foothills structure south of Turner Valley and a heavy

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gas flow had to be killed before drilling fluid could be run for continuing with rotary.

W. Spencer Cook has been awarded contract to drill the Charles W. Cook and W. Spencer Cook 1 William Reeves, in NE NW NW 5-2n-13w, Allegan County, Michigan.

General Petroleums, Calgary, is finishing Conrad 75-25-D for California-Standard in LSD 12, 25-5-16w4,, in the Conrad field, southern Alberta. Location is ½ mile south of production.

Veedor Supply & Development Co. is the drilling contractor on the Ohio Oil Co. 1 Silkman Center, in NE SW 31-11-22w, Trego County, Kansas. Vickers Petroleum Co. and York State Oil Co. are supporting the test, which is located approximately 3 miles south of production in the Wakeeney pool.

General Petroleums, of Calgary, Alta., is completing Conrad-Province 17-32-B, LSD 16, 32-5-15w4, in the Conrad field, southern Alberta, for California-Standard Oil.

United States Now Leads In Tanker Tonnage

WASHINGTON. — Since the beginning of the war in Europe this country's shipyards have constructed 579 tankers, a report from the president of the American Bureau of Shipping reveals. This achievement more than compensated for Allied losses through sinkings and places the United States in the lead in points of tanker tonnage.

The report shows that in September 1939 there were in the world 1,507 tankers, with 1,033 flying the flags of the United States, Great Britain and Norway.

Including the 238 tankers still under contract to be built, the United States, by the end of 1945, should control approximately 1,000 of these ships, according to the bureau. This fleet will then equal in capacity that of the entire prewar world fleet, since operating speeds of the new type vessels are 25 per cent higher than for the older types.

CALENDAR

October

American Association of Oil Well Drilling Contractors, Oklahoma City, October 1-2.

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting. Tulsa, October 15, 16 and 17.

American Gas Association, annual meeting, Engineering Societies Building, New York, October 24.

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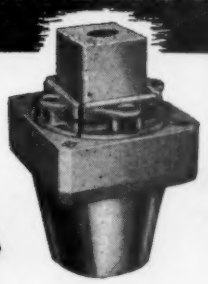

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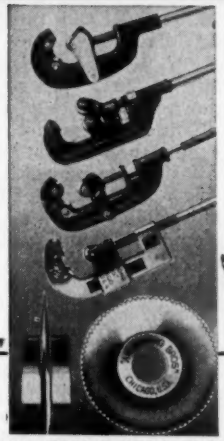

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PERSONALS

Schilthuis Goes to Higher Position With Humble

RALPH J. SCHILTHUIS, who since July 1941, has been on leave of absence from Humble Oil & Refining Co. as assistant director of production for the Petroleum Administration for War in Washington, has resigned his post there and returned to the company as division petroleum engineer for the Southwest Texas division, production department.

Schilthuis in 1941 was called to Washington to the Office of the Petroleum Coordinator, predecessor of PAW, as the second man in the production division. He played a major role in organizing the division, in shaping the policies and programs on oil production, and in successfully directing the division's work. His work drew commendation not only from PAW officials but from oil leaders over the nation.

Graduating from the Colorado School of Mines in June 1930, he immediately became a student engineer with Humble and had experience in the refining and production departments. He was supervising petroleum engineer in the engineering division when he went on leave of absence with PAW. His promotion to the post of division engineer became effective with his return to active duty with the company.

Jack Lively has become scout for the Standard Oil Co. of Texas at Midland, Tex., succeeding **George D. Echols.**

Louis J. Regan, geologist for The Texas Co. (California), has been transferred from Los Angeles to Oregon, where the company is drilling a wildcat in the Klatskanie district. He will watch geological developments in the project.

Col. Gustave H. Vogel, Washington, has been awarded the Order of the British Empire and an Oak Leaf Cluster to the Legion of Merit for his work as chief of the petroleum section, Allied Force Headquarters, in the Mediterranean theater. The British citation said that Colonel Vogel "has been responsible for the importation of all oil products, for planning distribution, utilizing installations, and assuring the oil supply of the Allied Armies in Africa and Italy. In this work, he has met with outstanding success and has created an organization never yet equaled in the theater of war."

E. A. Roberts, Jr., petroleum engineer, formerly with Grayburg Oil Co. at Artesia, N. M., has joined Drilling & Exploration Co. at Hobbs, N. M.

John L. Rich, consulting geologist and formerly professor of geology at University of Cincinnati, has left for China to serve as a consultant to China Natural Resources Commission on exploration and development of petroleum and natural-gas reserves.

C. S. Teitsworth, for the past 5 years vice chairman of the manufacturing committee of Socony-Vacuum Oil Co., Inc., has been made chairman. He succeeds **W. F. Burt,** who was named a vice president and a member of the executive committee. Teitsworth, a Stanford University graduate, has been in the service of Socony-Vacuum and affiliated companies for 19 years.

Paul Charrin, formerly vice president and general manager of Schlumberger Well Surveying Corp., has opened an office in Houston as an independent geophysical consultant and engineer.

Maj. Paul R. Turnbull, after having been on military leave of absence since August 1942, has returned to Humble Oil & Refining Co. to serve as assistant division petroleum engineer in the Southwest Texas division, production department. He was transferred to this post from the position of assistant superintendent of the Flour Bluff district of Humble's production department which he held when he went into the Air Corps.

Peter K. Ustin, who was a design draftsman for Shell Development Co. at Emeryville, Calif., has been promoted to engineer in the engineering department at the same plant.

P. S. Magruder, formerly manager of the gas department of General Petroleum Corp., Los Angeles, has been named assistant manager of manufacturing. **H. L. Eggleston,** formerly general superintendent for Gilmore Oil Co., has been appointed manager of the gas department. **M. W. Kibre,** superintendent of the gas department at Vernon, Calif., has been made assistant manager of the gas department. **H. A. Sting,** gas engineer at Vernon, has been named superintendent of the gas department in the southern division, with headquarters in Vernon. **A. C. Lyles** has been promoted from chemist at the Santa Fe Springs gas laboratory to gas engineer, in charge of the laboratory.

R. H. McAshan has been made scout in West Texas and New Mexico for Seaboard Oil Co. of Texas, taking the place of **Ed Dawson,** who was promoted to district landman at Corpus Christi.

L. A. (Pat) Henry, veteran pilot, with 13 years of service with Standard Oil Co. of Indiana, has been appointed manager of the company's aviation department in the Chicago general sales office promotion department. **John P. Porter,** aviation salesman for almost 20 years, has become airlines representative in the aviation department.

Glenn E. Gibson, of the Denver office of Phillips Petroleum Co., has been placed in charge of new land office at Casper, Wyo. His territory includes northern Wyoming, Montana, Idaho, South Dakota, North Dakota and western Nebraska.

Maj. T. J. Fuson has returned to his post as assistant division petroleum engineer of Humble Oil & Refining Co.'s Gulf Coast division after 3½ years in the Army. Except for a special mission to the Middle East in the summer of 1944, Major Fuson

had been in the India-Burma theater since going overseas in November 1943. He was technical operations officer assisting in the planning for and coordinating of construction and operations of approximately 3,500 miles of military pipe-line system from India to China.

G. B. Hallman is a new scout for Mid-Continent Petroleum Corp.'s Midland, Tex., office, covering the south side of the West Texas Permian basin. **R. A. Whitson,** who has been scouting the entire district, will handle the north area.

J. S. Miller is assistant manager of the land and geological department and **D. L. Norling** is geologist for the Devonian Oil Co.'s new headquarters for that department recently opened in Fort Worth.

Martin A. McNulty succeeds **C. T. Bergeson,** who resigned as comptroller of Standard Oil Co. (Indiana) after nearly 30 years with the company. McNulty also has almost 30 years of service behind him, having started as office boy in 1916. His promotion is from assistant comptroller.

Peter K. Ustin, who was design draftsman for Shell Development Co., has been promoted to engineer in the engineering department at the Emeryville, Calif., plant, and **R. B. Hanning,** of the Shell Chemical Division, has been advanced from junior chemist to chemist at the Torrance, Calif., butadiene plant.

Sidney H. Smith, Jr., formerly gas engineer for Trinity Gas Corp., at Hebbronville, Tex., has resigned to take a position as gas engineer for R. Lacy and Southern Gas Co. in Longview, Tex.

Kenneth O. Beatty, Jr., has been appointed the Wolverine Trufin fellow at the University of Michigan for 1945-46 with a stipend of $200 a month. Beatty has a B.S. and M.S. from Lehigh University and was assistant professor of chemical engineering at Rhode Island State College before entering the Graduate School at Ann Arbor in 1944. The fellowship is sponsored by the Wolverine tube division of Calumet & Hecla Consolidated Copper Co., Detroit. Beatty will conduct his doctorate research problem on heat transfer through finned tubes.

Paul C. Shea, vice president of Colonial Beacon Oil Co., has been named acting manager of manufacturing for The Carter Oil Co.'s Northwest division, with headquarters in Billings, Mont. Shea, on leave of absence from Colonial Beacon for a minimum of 1 year, replaces **T. J. Landry,** who resigned recently to become a Carter marketing distributor at Kalispell, Mont. Shea has been in charge of manufacturing for Colonial Beacon, with headquarters at Everett, Mass. **T. R. Corbett** is made assistant manager of manufacturing for Carter's Northwest division, **O. C. Schorp,** president, announces. Since May 1944 he has been Carter's chief refining engineer, Northwest division. He will remain in Billings. A third change is the appointment of **R. D. Sloan,** formerly head of the company's scouting and statistical division in Tulsa, as division geologist for the Northwest division to succeed **D. L. Blackstone,** who is leaving Carter to return to University of Missouri as associate professor of geology. Sloan joined Carter soon after graduation from University of Oklahoma in 1933.

James J. Morrison, district and field superintendent at Lethbridge, Alta., for Canadian Western Natural Gas, Light, Heat & Power Co., has retired from active work. He joined the company in 1912 as a driller and pipe-line man.

Fred P. Shayes, district geologist in the Beeville, Tex., district for Union Producing Co., has been promoted to district manager. He has served United in the Beeville district since 1930.

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Equipment Men in News

Col. Joseph P. Woodlock has been elected executive vice president of Rochester Ropes and will take over his duties as soon as he can be released from his present assignment as associate director of Office of Surplus Property in the Reconstruction Finance Corp. He will make his headquarters in Culpeper, Va.

S. B. Taylor has been elected president of The Parker Appliance Co., Cleveland, Ohio. He succeeds **H. I. Markham,** who, until his recent elevation to the board chairmanship, has served as president, following the death January 1 of Arthur L. Parker, founder and chief executive of the company. Taylor was also elected a director.

James L. Ray has been named to head Joshua Hendy Iron Works' gas and steam-turbine engineering department in San Francisco and to supervise the considerable enlargement of its technical staff. Ray is the former chief gas-turbine design engineer of Allis-Chalmers Manufacturing Co.

Election of **N. J. Clarke** as senior vice president and **J. M. Schlendorf,** vice president in charge of sales, of Republic Steel Corp., is announced today by **T. M. Girdler,** board chairman, and **C. M. White,** president, following the directors' meeting of the corporation. Clarke has been vice president in charge of sales for Republic since September 1930, shortly after the corporation was formed, and will be succeeded in that position by Schlendorf who has been assistant vice president in charge of sales.

R. E. (Bob) Nagel, formerly with Universal Products Co., of Chicago, has accepted a position with The Fluor Corp., Ltd., of Los Angeles, Calif., and will be located at Fluor's New York offices as district sales manager.

Arthur Harvey, vice president of Cardwell Manufacturing Co., Wichita, Kans., left Buenos Aires recently for Brazil. He is on an extended tour of the fields of South America and has completed his field trips in Colombia, Ecuador, Peru and Argentina.

W. J. Campbell, of Petroleum Machinery Corp., is in South America on a business trip. He is visiting the oil fields of Venezuela and Colombia.

Henry Salvatori, president of Western Geophysical Co., Los Angeles, Calif., recently visited the Asuncion, Paraguay, offices of the company. **Michael A. Boccalery** is manager of Western's Paraguay operations, including geophysical work for Inion Oil Co.

Jack C. Pollard, vice president of Rogers-Ray, Inc., and Robert H. Ray Co., has recently returned from a 6-week trip to South America. **Sam Rogers** and **Robert H. Ray** will leave for South America the latter part of September for an extended trip on the continent. **Norman Teague** has been released from the Army and has joined the Ray company as South American representative with offices in Caracas, Venezuela. Teague will be in charge of gravity work in South America for the company. Before entering the service, he was with Stanolind Oil & Gas Co. in the geological department.

Chiksan Co., Brea, Calif., announces the establishment of an affiliate company, Chiksan Export Co., to handle export sales. The new company will headquarter in Brea, with branch offices in New York City and Houston, Tex. Cable address is "Chiksan." **W. Edgar Spear,** president of the Chiksan company, heads the new export company in the same position, with **Lee J. Baird,** Chiksan vice president and sales manager, also in charge of export sales. The New York office at 50 Church Street, will be managed by **H. A. Maland,** and the Houston office, now in process of organization, with temporary mailing address P. O. Box 276, will be under the management of **G. R. Winder,** who transfers from Brea.

Appointment of **Forrest H. Ramage** as assistant manager of sales of the pipe division, Republic Steel Corp., has been announced by **J. M. Schlendorf,** vice president in charge of sales.

Election of **Henry F. Dever** as president of Brown Instrument Co., a wholly owned subsidiary of Minneapolis-Honeywell Regulator Co., is announced by **Harold W. Sweatt,** president of the parent company. Dever, who has been serving as vice president in charge of engineering for Minneapolis-Honeywell, succeeds **Charles B. Sweatt** as president of Brown. The latter, vice president and director of Minneapolis-Honeywell, has withdrawn from Brown and will henceforth devote his entire attention to supervision of the expanded sales activities of the Honeywell organization and its subsidiaries. Dever will also assume the responsibilities of **E. B. Eveleth,** general manager of Brown Instrument, who, because of ill health, has requested that he be relieved of his duties at an early date. Engineering activities of the parent company will be under the direction of **W. J. McGoldrick** who has been vice president in charge of aeronautical engineering.

Edward J. Burnell, vice president, Link-Belt Co., Chicago, Ill., announces the appointment of **A. C. Fellinger** as sales manager, power transmission machinery, with headquarters at the company's Ewart plant in Indianapolis. He succeeds C. Walter Spalding, deceased.

Appointment of **Bennett S. Chapple, Jr.,** as assistant to vice president of sales, United States Steel Corp. of Delaware, Pittsburgh, Pa., is announced by **David F. Austin,** acting vice president. He was formerly assistant manager of sales of the New York district sales office of Carnegie-Illinois Steel Corp. and since February 1, 1944, has been assistant to president, Firth Sterling Steel Co.

David P. Graham, assistant to the president, Peabody Engineering Corp., has been made second vice president and a member of the board of directors. **Charles B. Hill** continues as first vice president. **Clarence A. Snider,** formerly secretary-treasurer, is now treasurer, and **H. Victor Crawford** is secretary.

H. L. Stevenson has resigned from the Petrolite Corp. to become a treating engineer for Acid Engineering Co. at the Tulsa station.

Creation of a new production division of the manufacturing department at Caterpillar Tractor Co., under the direction of **William Naumann,** is announced by **J. R. Munro,** general factory manager. The revision in organization will place inventory control, factory burden, work scheduling and related activities under one control.

Appointment of **James L. Naylor** as assistant manager of the dyestuff department, Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., is announced by **J. Pfister,** manager.

Electric Machinery Manufacturing Co., Minneapolis, Minn., announces the recent appointment of **James De Kiep** as chief engineer in charge of electrical and mechanical design and development.

Southern Geophysical Co., Inc., has opened offices in the Sinclair Building, Fort Worth, Tex., and **Dr. Sidon Harris** is president of the new company. This company specializes in seismograph surveys and maintains a consulting and interpretation service for seismic data recorded by any company.

A. G. Bussmann and **L. D. Granger** have been elected vice presidents of Wickwire Spencer Metallurgical Corp. Bussmann is also vice president in charge of sales of Wickwire Spencer Steel Co. Granger has previously been assistant to the executive vice president of Wickwire Spencer Metallurgical Corp. He is also vice president of American Wire Fabrics Corp., another Wickwire Spencer subsidiary.

The Nox-Rust Corp., 2461 South Halsted Street, Chicago, Ill., has changed its name to Nox-Rust Chemical Corp. **George A. Daubert** is president. A tenth anniversary "Use Chart" is available on request.